Installation, Setup and Operation

INSTRUCTIONS

for

CE

SUNNEN® VERTICAL HONING MACHINE

SV3 Series

READ THE FOLLOWING INSTRUCTIONS THOROUGHLY AND CAREFULLY BEFORE UNPACKING, INSPECTING, OR INSTALLING THE SUNNEN® SV3 VERTICAL HONING MACHINE.

"SUNNEN, THE SUNNEN LOGO, GENERAL HONE AND THE GENERAL HONE LOGO ARE REGISTERED TRADEMARKS OF SUNNEN PRODUCTS COMPANY."

SUNNEN® PRODUCTS COMPANY • 7910 MANCHESTER AVENUE • ST. LOUIS, MO 63143, U.S.A. • PHONE: 314-781-2100

GENERAL INFORMATION

The Sunnen® equipment has been designed and engineered for a wide variety of parts within the capacity and limitation of the equipment. With proper care and maintenance this equipment will give years of service.

READ THE FOLLOWING INSTRUCTIONS CAREFULLY AND THOROUGHLY BEFORE UNPACKING, INSPECTING, OR INSTALLING THIS EQUIPMENT.

IMPORTANT: Read any supplemental instructions BEFORE installing this equipment. These supplemental instructions give you important information to assist you with the planning and installation of your Sunnen equipment.

Sunnen Technical Service Department is available to provide telephone assistance for installation, programming, & troubleshooting of your Sunnen equipment. All support is available during normal business hours, 8:00 AM to 4:30 PM Central Time. Emergency breakdown support is available on a 24 hour / 7 day basis.

Review all literature provided with your Sunnen equipment. This literature provides valuable information for proper installation, operation, and maintenance of your equipment. Troubleshooting information can also be found within the Instructions. If you cannot find what you need, call for technical support.

Where applicable, programming information for your Sunnen equipment is also included. Most answers can be found in the literature packaged with your equipment.

Help us help you. When ordering parts, requesting information, or technical assistance about your equipment, please have the following information available:

- Have ALL MANUALS on hand. The Customer Services Representative or Technician will refer to it.
- Have Model Number and Serial Number printed on your equipment Specification Nameplate.
- Where Applicable: Have Drive model and all nameplate data. Motor type, brand, and all nameplate data.

For Troubleshooting, additional information may be required:

- Power distribution information (type - delta, wye, power factor correction; other major switching devices used, voltage fluctuations)
- Installation Wiring (separation of power & control wire; wire type/class used, distance between drive and motor, grounding).
- Use of any optional devices/equipment between the Drive & motor (output chokes, etc.).

For fast service on your orders call:

Sunnen Automotive Customer Service toll free at: 1-800-772-2878

Sunnen Industrial Customer Service toll free at: 1-800-325-3670

Customers outside the USA, contact your local authorized Sunnen Distributor.

Additional information available at: http://www.sunnen.com or e-mail: sunnen@sunnen.com

NOTE: Sunnen reserves the right to change or revise specifications and product design in connection with any feature of our products contained herein. Such changes do not entitle the buyer to corresponding changes, improvements, additions, or replacements for equipment, supplies or accessories previously sold. Information contained herein is considered to be accurate based on available information at the time of printing. Should any discrepancy of information arise, Sunnen recommends that user verify the discrepancy with Sunnen before proceeding.

ESD PREVENTION REVIEW

Let's review the basics of a sound static control system and its effective implementation. First, in the three step plan:

1. Always ground yourself when handling sensitive components or assemblies.
2. Always use a conductive or shielded container during storage or transportation. These materials create a Faraday cage which will isolate the contents from static charges.
3. Open ESD safe containers only at a static safe work station.

At the static safe work station, follow these procedures before beginning any work:

A. Put on your wrist strap or foot grounding devices.

B. Check all grounding cords to make sure they are properly connected to ground, ensuring the effective dissipation of static charges.

C. Make sure that your work surface is clean and clear of unnecessary materials, particularly common plastics.

D. Anti-static bubble wrap has been included for use at the machine when an ESD safe workstation is not available.

You are now properly grounded and ready to begin work. Following these few simple rules and using a little common sense will go a long way toward helping you and your company in the battle against the hazards of static electricity. When you are working with ESD sensitive devices, make sure you:

GROUND

ISOLATE

NEUTRALIZE

SUNNEN® LIMITED PRODUCT WARRANTY

Sunnen® Products Company and its subsidiaries (SPC) warrant that all new SPC honing machines, gaging equipment, tooling, and related equipment will be free of defects in material and/or workmanship for a period of one year from the date of original shipment from SPC.

Upon prompt notification of a defect during the one-year period, SPC will repair, replace, or refund the purchase price, with respect to parts that prove to be defective (as defined above). Any equipment or tooling which is found to be defective from improper use will be returned at the customer's cost or repaired (if possible) at customer's request. Customer shall be charged current rates for all such repair.

Prior to returning any SPC product, an authorization (RMA#) and shipping instructions must be obtained from the Customer Service Department or items sent to SPC will be returned to the customer.

Warranty Limitations and Exclusions This Warranty does not apply to the following:

- Normal maintenance items subject to wear and tear: (belts, fuses, filters, etc).
- Damages resulting from but not limited to:
  - › Shipment to the customer (for items delivered to customer or customer's agent F.O.B., Shipping Point)
  - › Incorrect installation including improper lifting, dropping and/or placement
  - › Incorrect electric power (beyond +/- 10% of rated voltage) including intermittent or random voltage spikes or drops
  - › Incorrect air supply volume and/or pressure and/or contaminated air supply
  - › Electromagnetic or radio frequency interference from surrounding equipment (EMI, RFI)
  - › Storm, lightning, flood or fire damage
  - › Failure to perform regular maintenance as outlined in SPC manuals
  - › Improper machine setup or operation causing a crash to occur
  - › Misapplication of the equipment
  - › Use of non-SPC machines, tooling, abrasive, fixturing, coolant, repair parts, or filtration
  - › Incorrect software installation and/or misuse
  - › Non-authorized customer installed electronics and/or software
  - › Customer modifications to SPC software

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Shipping Damages

Except in the case of F.O.B., Buyer's destination shipments, SPC will not be liable for any settlement claims for obvious and/or concealed shipping damages. The customer bears the responsibility to unpack all shipments immediately and inspect for damage. When obvious and/or concealed damage is found, the customer must immediately notify the carrier's agent to make an inspection and file a claim. The customer should retain the shipping container and packing material.

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Any alteration or reverse engineering of the software is expressly forbidden and is in violation of this agreement.

SPC reserves the right to update the software covered by this agreement at any time without prior notice and any such updates are covered by this agreement.

SAFETY INSTRUCTIONS

READ FIRST

This machine, like any equipment, may be dangerous if used improperly. Please read all warnings and instructions before attempting to use this machine.

Always disconnect power at main enclosure before servicing machine.[1]

Always wear eye protection when operating this machine.

NEVER open or remove any machine cover or protective guard with power "ON." Always disconnect power at main enclosure before servicing this equipment.[1]

DO NOT attempt any repair or maintenance procedure beyond those described in this book. Contact your Sunnen® Field Service Engineer or Technical Services Representative for repairs not covered in these instructions.

Due to the wide variety of machine configurations, all possibilities cannot be described in these instructions. Instructions for safe use and maintenance of optional equipment ordered through Sunnen, will be provided through separate documentation and/or training provided by your Sunnen Field Service Engineer or Technical Services Representative.

DO NOT attempt to defeat any safety device on this machine or on any of the optional equipment.

If specially built automation components are added to this system, be sure that safety is not compromised. If necessary, obtain special enlarged work area safety system from Sunnen Products Co.

CE Indicates CE version ONLY.

[1] DO NOT touch electrical components until main input power has been turned off and *CHARGE* lamps are extinguished. WARNING: The capacitors are still charged and can be quite dangerous.

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INTRODUCTION

This Instruction Manual is provided to give the information required to install, operate, and maintain the SV3-Series Sunnen Vertical Honing Machines.

As there are numerous workpieces that can be honed on this machine, all possible combinations cannot be discussed here. The determining factor as to whether a particular part or material can be honed in the machine will come with experience from working with the machine in your shop.

When ordering parts for, or requesting information about your machine, include the serial number of your machine.

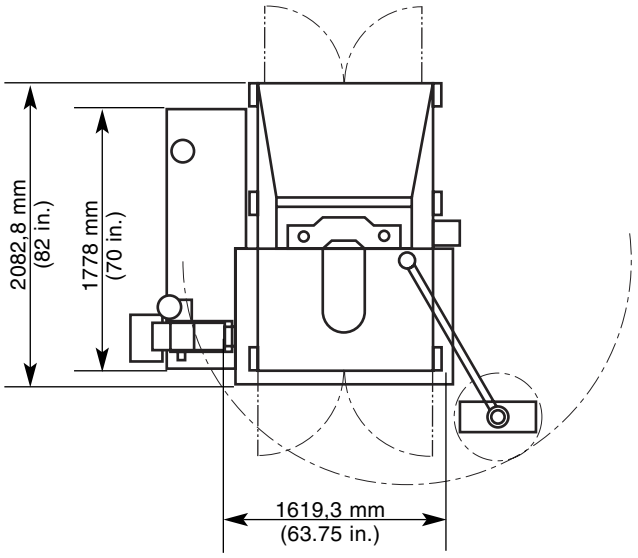
READ THE FOLLOWING INSTRUCTION THOROUGHLY BEFORE UNPACKING, INSPECTING, OR INSTALLING THE SUNNEN SV3 VERTICAL HONING MACHINE.

GENERAL INFORMATION & SPECIFICATIONS

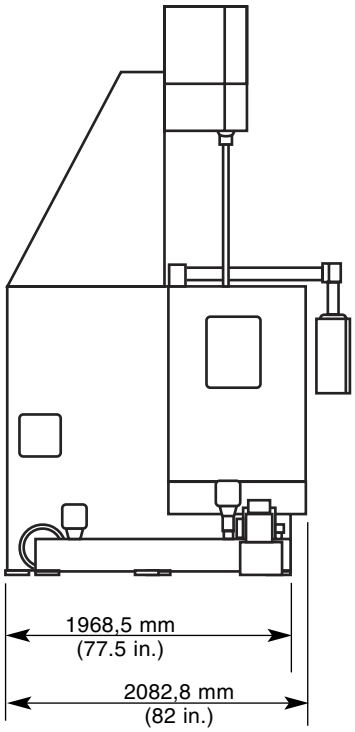
Sunnen Vertical Honing Machine - SV3-Series

Diameter Range (OD)[1]:	12,7 - 305 mm (.50 - 12 in.)
Workpiece Weight[1]:	1360 kg (3000 lbs.)
Workpiece Length[1]:	1 m (39.38 in.)
Work Area Envelope (Table):	762 x 1270 mm (30 x 50 in.)
Stroke Length Range[1]:	Up to 1219 mm (48 in.)
Reciprocation Speed (Stroke):	3,04 - 27,4 mpm (10 - 90 fpm)
Hydraulic (Stroke) Motor:	7,5 kW (10 hp)
Thrust:	1134 kg (2500 lbs.) maximum
Spindle Speeds:	10 to 300 rpm (Opt: 10 to 500 rpm)
Spindle Motor:	3,7 kW (5 hp) / 7,5 kW (10 hp)
Feed - Rotary:	Up to 14,8 m-kg (20 ft-lb) maximum torque
Feed - Push Feed:	Up to 952 kg (2100 lbs.) force
Coolant Pump:	Centrifugal pump
Pump Motor:	0,187 kW (1/4 hp)
Coolant Capacity:	189 L (50 US gal.)
Pump Rate:	38 LPM (10 GPM)
Coolant Requirements:	Sunnen Industrial Honing Fluids
Floor Space:	2159 W x 2083 D x 3937 H mm (85 x 82 x 155 in.)
Floor Weight (Dry):	2268 kg (5000 lbs.)
Floor Load:	739 kg/sq. meter (151 lbs./sq. ft)
Pneumatic Requirements:	30 LPM @ 5,4 Bar (1 CFM @ 80 PSI)
Electrical Requirements:	230/460V, 60Hz, 3Ph 380/400V, 50Hz, 3Ph
Color:	Pearl Gray / Pewter Gray / Burgundy Trim
Noise Emission:	Less than 76 dB(A) continuous Less than 78 dB(A) peak Load (max. noise) condition in a typical factory environment.

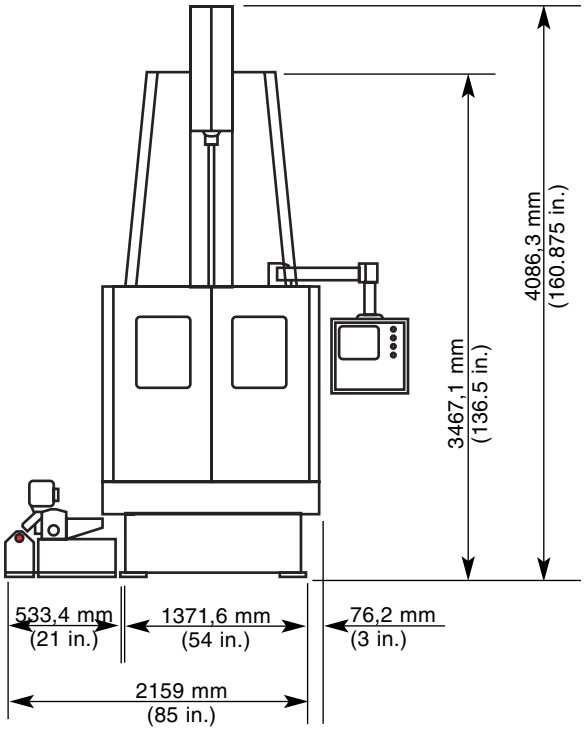
[1] Diameter range, length range, and workpiece weight are contingent on workpiece and application.



TOP VIEW



SIDE VIEW



FRONT VIEW

FLOOR LAYOUT - Sunnen SV3 Vertical Honing Machine

SECTION 1
INSTALLATION

PURPOSE

This Section is designed to aid user in unpacking, inspecting, and installing Sunnen® Vertical Honing Machine, SV3 Series. Hereafter, referred to as the Machine (see Figure 1-1).

FIGURE 1-1, Vertical Honing Machine

TOOLS & MATERIALS

The following tools and materials are required for unpacking and installing machine:

Wire Cutters/Strippers	Knife
Screw Driver (Std. nose)	Hammer
Slip-Joint Pliers	Crow Bar
Cleaning Solvent	Tin Strips
Open End Wrench (17, 19 & 24 mm)	

INSTALLATION

Read the following instructions carefully and thoroughly before unpacking and inspecting Machine. All references to right and left in these instructions are, unless otherwise noted, as seen by the operator as one looks at Machine or assembly being described.

1. Remove top and front of shipping crate.

2. Cut, remove and discard shipping bands.

NOTE: Machine is shipped lying on its back with shipping brackets mounted to top and bottom of base.

CAUTION

Weight is approx. 3000 lb.

3. Move machine to desire location using a forklift. Slide forks (minimum 6' long) under skid (side only).

4. Remove any loose hardware package with machine.

5. Inspect Machine and Components for dents, scratches, or damage resulting from improper handling by carrier. If damage is evident, immediately file a claim with carrier.

CAUTION

Remove machine from skid. Do not lift directly on machine. Lift with shipping brackets only.

6. Remove machine from skid with a crane by attaching a clevis to each front mounting pad and a strap on 6" channel at top of upper shipping bracket.

CAUTION

Use forklift to prevent kickback.

7. The machine can be set up right by lifting on 6" channel of top-shipping bracket. Take care to use a forklift at bottom front edge of base to prevent a sudden dropping and kickback when machine tips upright.

8. Install leveling screws in mounting pads (see Figure 1-2). Machine does not need to be bolted to floor but should be set on 1/2" thick steel pads.

9. Place a machinist level on machine table and level machine by adjusting Leveling Bolts on Support Feet, using a 24 mm Open End Wrench.

10. For permanent installation, secure Machine's Support Feet to Floor with appropriate fasteners (not supplied).

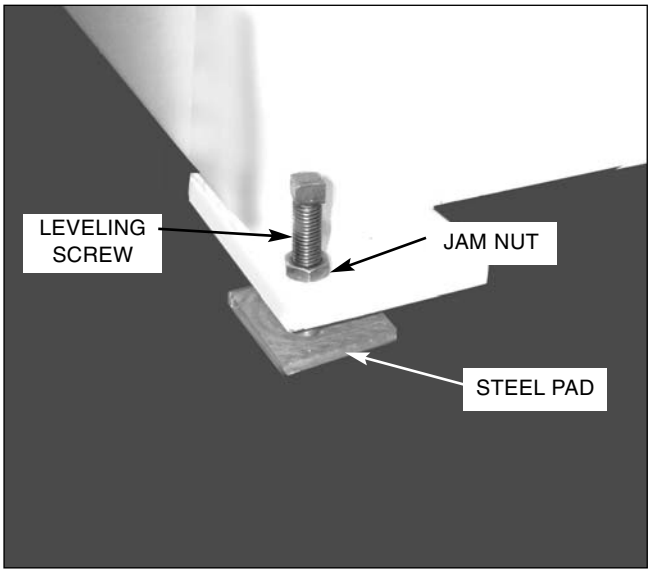


FIGURE 1-2, Leveling Screws

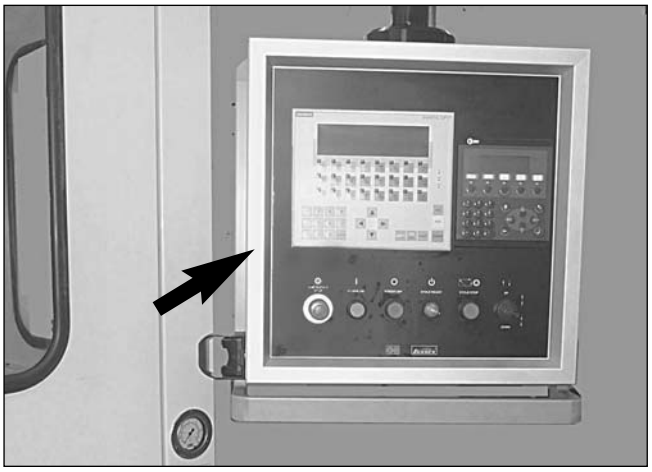


FIGURE 1-3, Operator Control Console

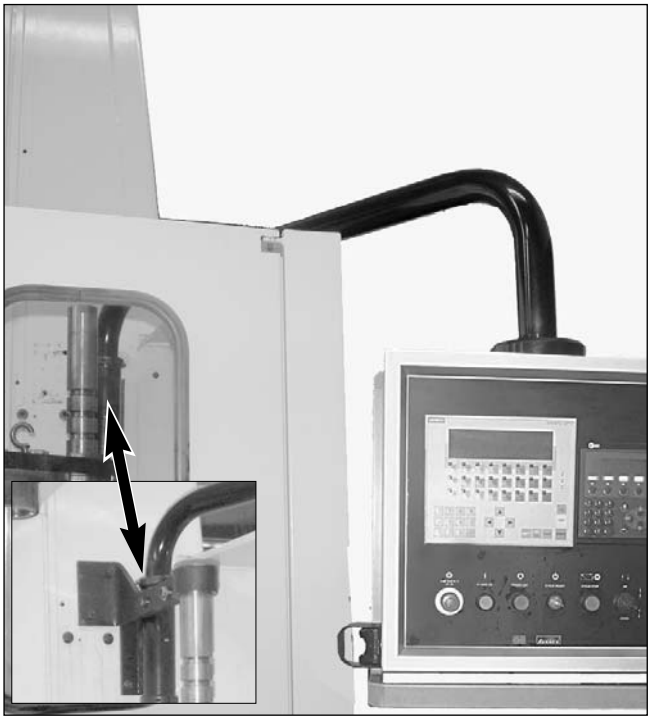


FIGURE 1-4, Swing Arm

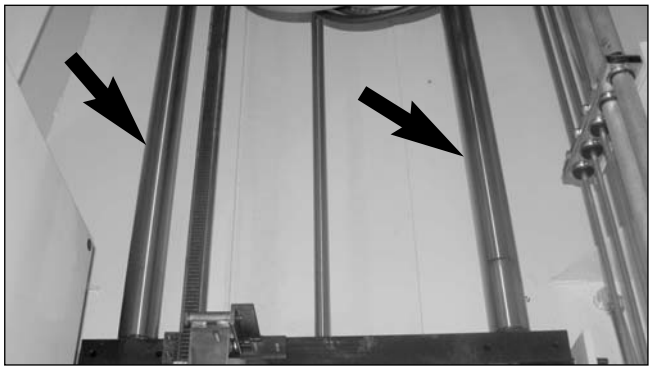


FIGURE 1-5, Way Bars

FIGURE 1-6, Doors

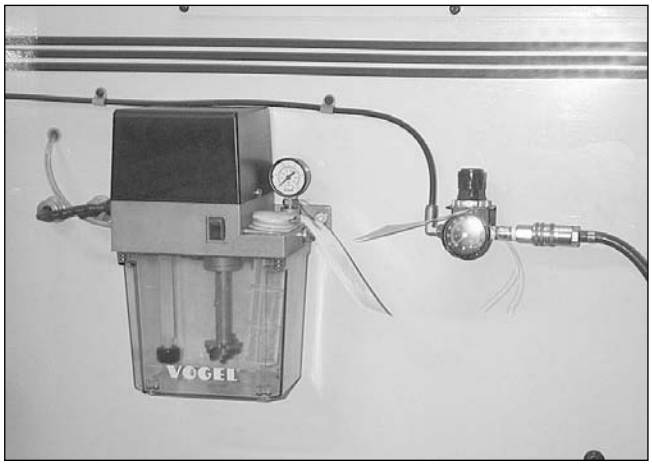


FIGURE 1-7, Lube System

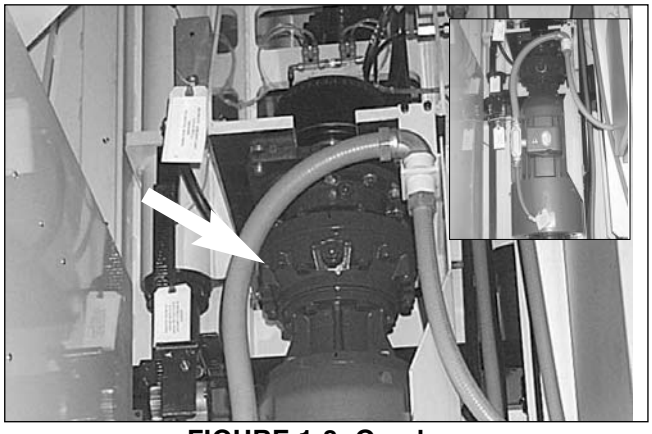


FIGURE 1-8, Gearbox

11. Remove top and bottom shipping brackets after machine is setting upright.

12. After machine is up right and in position, remove wrapping from operator's console and bracing bolted to side panels (see Figure 1-3).

13. If applicable: While supporting console and arm with a crane, remove bolts mounting it to offset shipping pad where it attaches to machine column.

• Remove shipping pad from column and remount assembly, without pad, to four holes on machine column.

• Discard shipping pad. (Some machines may not have this pad.)

14. Adjust upper shaft collar (with pins) on operators console swing arm so swing arm can not move under spindle carriage assembly or hit column at each extreme of its movement (see Figure 1-4).

15. Remove shaft collars from way bars securing carriage from movement during shipping (see Figure 1-5).

16. Remove strap from encoder bracket mounted at tile bottom of way bar assembly.

17. Remove doors, if supplied, from shipping skid and install on machine (see Figure 1-6). (Verify alignment of door interlock switch plungers on CE machines)

18. Clean rust preservative from way bars and any other bright metal surfaces.

19. Fill way lube system with a good grade of way lube oil (see Figure 1-7).

20. Remove #8-32 socket head cap screw from gearbox riser pipe cap (see Figure 1-8). (Located on spindle carriage and accessed from inside column.)

21. Position coolant system on left side of base with filter under trough extending from base.

22. A small chute is provided to extend trough. Attach chute to the trough with two 1/4-20-button head cap screws (see Figure 1-9).

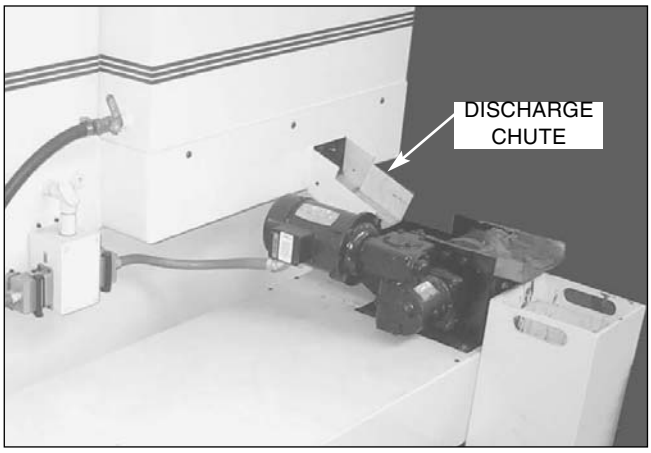


FIGURE 1-9, Discharge Chute

23. Connect coolant hose to hose barb on base and clamp in place.

24. Connect two plugs (one if no filter is used) to receptacles on small electrical box located on base.

25. Connect drive adapter to spindle nose by aligning pins with bayonet slots, push up while allowing spring loaded collar to move (see Figure 1-10).

• Rotate pins into slots and allow collar to drop back down.

• Tighten ring nut on drive adapter against spindle nose. (Rotate hex shaft to align drives feed rod hex socket inside spindle shaft.)

• Connect desired tooling to adapter.

PNEUMATIC CONNECTION

Connect pneumatic line (airline) as follows (see Figure 1-11):

NOTE: The Factory Air Supply Line is not supplied. A minimum of 0,55 MPa (80 psi) clean, dry compressed air is required for proper operation.

1. Install Quick-Disconnect (not supplied) in airline port on Airline Filter Regulator.

2. CONNECT 1/2 in. (13 mm) factory air supply line (not supplied) to Quick-Disconnect.

3. Airline Filter Regulator Valve: This valve is preset at the factory to 0,55 MPa (80 psi).

ELECTRICAL REQUIREMENTS

All wiring is to be performed by a competent, Licensed Electrician in accordance with all local, state, and federal codes and regulations; along with any special information provided on machine nameplate or electrical specification plate.

WARNING

All wiring and electrical equipment service should be performed by authorized personnel ONLY.

CAUTION

Note model electrical supply cord requirement printed on machine nameplate or electrical specification plate. Do not attempt to connect machine if supply voltage is not within following acceptable limits as noted on nameplate or electrical specification plate. If supply voltage is not within these limits MACHINE WILL BE DAMAGED.

• Verify supply voltage is same as voltage on Machine Nameplate or Electrical Specifications Plate.

• If supply voltage does not match voltage stated on Electrical Specification Plate but is within acceptable limits, electrical connection can proceed but Machine Conversion below will be necessary.

ELECTRICAL CONNECTION

A pre-drilled hole has been provided in Electrical Enclosure for Electrical Supply Cord (not supplied). Connect Cord as follows (see Figure 1-12).

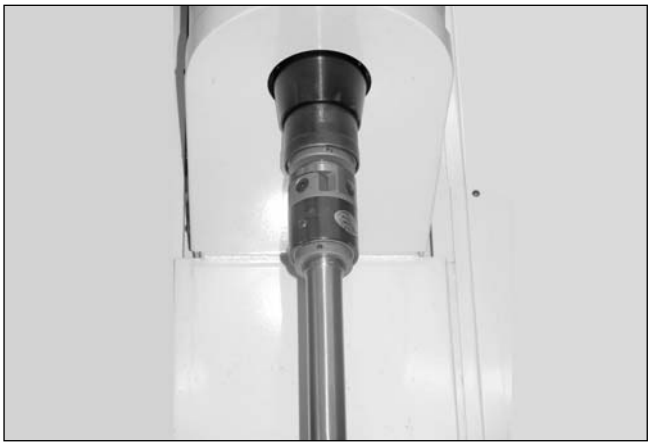


FIGURE 1-10, Drive Adapter

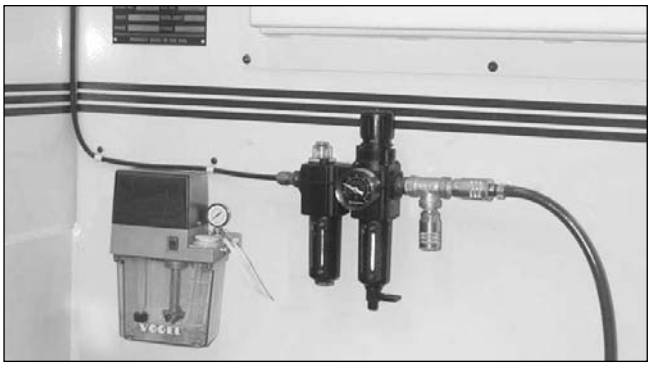


FIGURE 1-11, Pneumatic

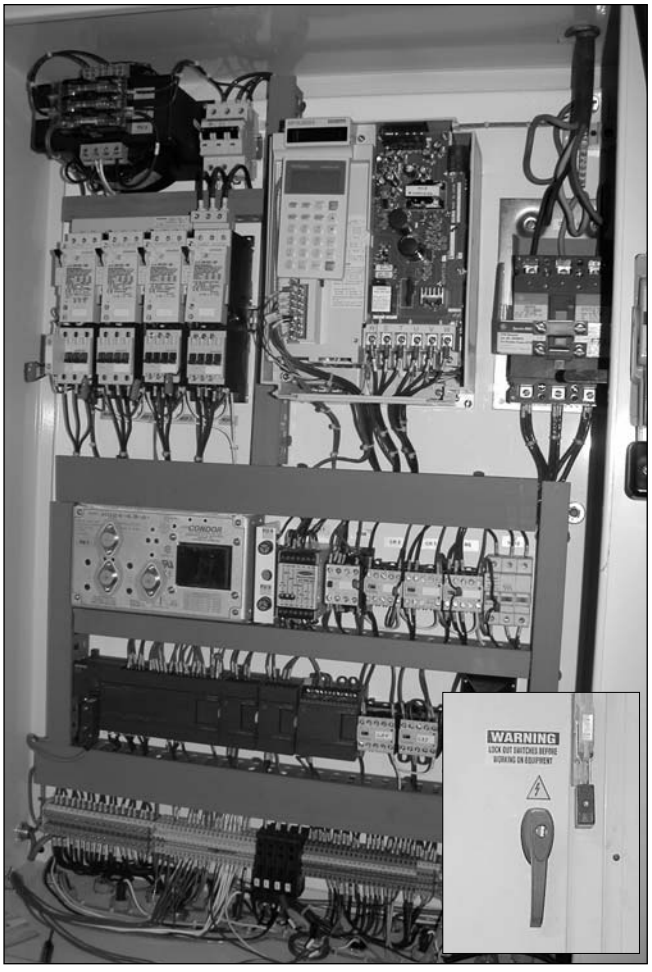


FIGURE 1-12, Electrical

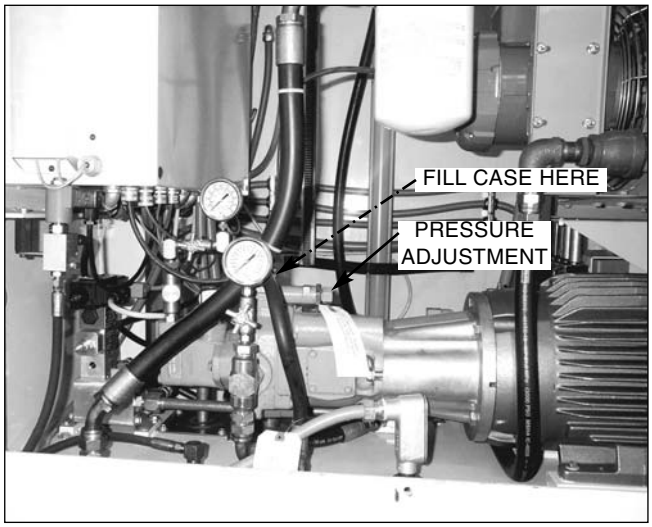


FIGURE 1-13, Hydraulic

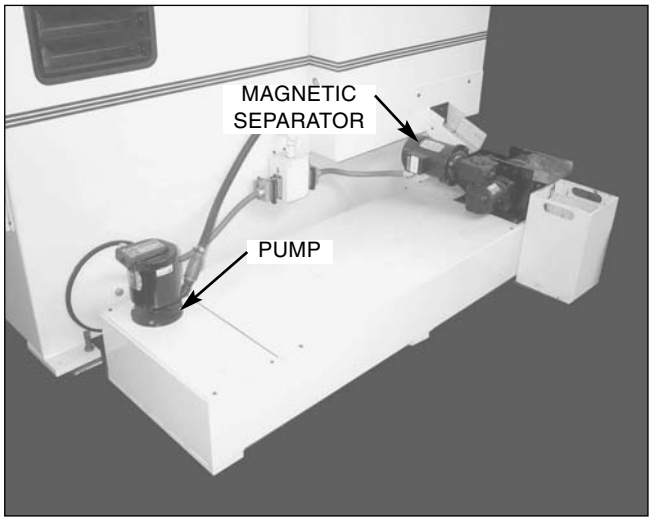


FIGURE 1-16, Coolant Reservoir

NOTE: For Cord dimensions refer to General Information & Specification at front of this manual.

CAUTION

Doors are equipped with lockable Safety Door Latches. Doors should be closed and latched during operation to prevent accidental interruption of operation from doors being opened. Doors Latches should be Locked-Out and Tagged during servicing to prevent machine from being powered up.

1. If applicable: Loosen Safety Latches on door(s) to enclosure, using a screwdriver. Or, on CE models, unlock doors to Electrical Control Enclosure using key supplied with machine. Door(s) to enclosure is equipped with Key-Lock Safety Latches.

WARNING

Residual Voltage exists for 2-3 minutes after Master ON/OFF Switch is turned OFF. Before working inside Enclosure, wait for all fans to stop running to allow drives to discharge.

2. Turn Master ON/OFF Switch to OFF position and open Doors. (Doors WILL NOT open unless Master ON/OFF Switch is in OFF position.)

WARNING

You must use hole provided. Drilling any new holes in electrical enclosure may void machine warranty.

3. Remove hole plug from entrance hole in enclosure and install an approved oil tight fitting.

4. Insert Electrical Supply Cord through Oil Tight Fitting and route to Electrical Disconnect Block. Allow for approximately 305 mm of cable from where it enters Enclosure; then cut off excess.

5. Strip 153 mm (6 in.) off cable's outer jacket.

6. Strip 6 mm (1/4 in.) of insulation off each wire.

7. Connect Green Wire (GRN) to PE Terminal on Electrical Disconnect Block (Earth Ground).

8. If applicable: Connect Blue Wire to E (Zero Point) as noted on Block.

9. Connect other three wires to Disconnect Block (CB1) as noted on Block (L1, L2, L3).

10. Route and secure Cord inside of Enclosure.

11. Tighten Oil Tight Fitting.

12. Close and secure/lock Door(s) to Enclosure.

13. Route and connect Electrical Supply Cord to power source. (PLUG Machine's Electrical Supply Cord into a properly polarized grounding-type wall receptacle.)

14. Turn ON Master ON/OFF Switch.

HYDRAULIC SYSTEM

Fill hydraulic system (50 gal.) at filler cap on tank (see Figure 1-13). Fill pump case (2 qt.) by temporarily removing hose and filling through fitting with medium weight hydraulic oil. (BP Energol HLP-46 or equivalent pre-filtered to 10 micron.) Reinstall the hose.

COOLANT RESERVOIR

Fill coolant reservoir (see Figure 1-14). Maximum capacity of reservoir is 189 Liters (50 gal.) subsequent to running Coolant pump. Minimum capacity of Coolant Reservoir, for proper pump operation is 110 Liters (29 gal.).

MAGNETIC SEPARATOR (Optional)

Consult installation Instructions packaged with Magnetic Separator (refer to Figure 1-14).

OPERATIONAL CHECK

Read Sections 1 and 2 thoroughly and carefully before performing the Operational Check.

NOTE: Power up and start machine to check for proper operation per machine Manual Honing Cycle.

1. Operate Machine and check rotation of Spindle Shaft. Rotation of Shaft should be counterclockwise, as viewed from output end of Spindle Drive Motor. If rotation is incorrect, reverse any two wires (red, white, or black) of electrical supply cord, where they connect to Disconnect Block.

2. Operate Machine and check rotation of optional equipment according to Installation Instruction package with optional equipment.

3. Set up and test all machine functions (refer to Section 3).

4. After unpacking and installing Machine, clean and lubricate (refer to Section: 4, Routine Maintenance).

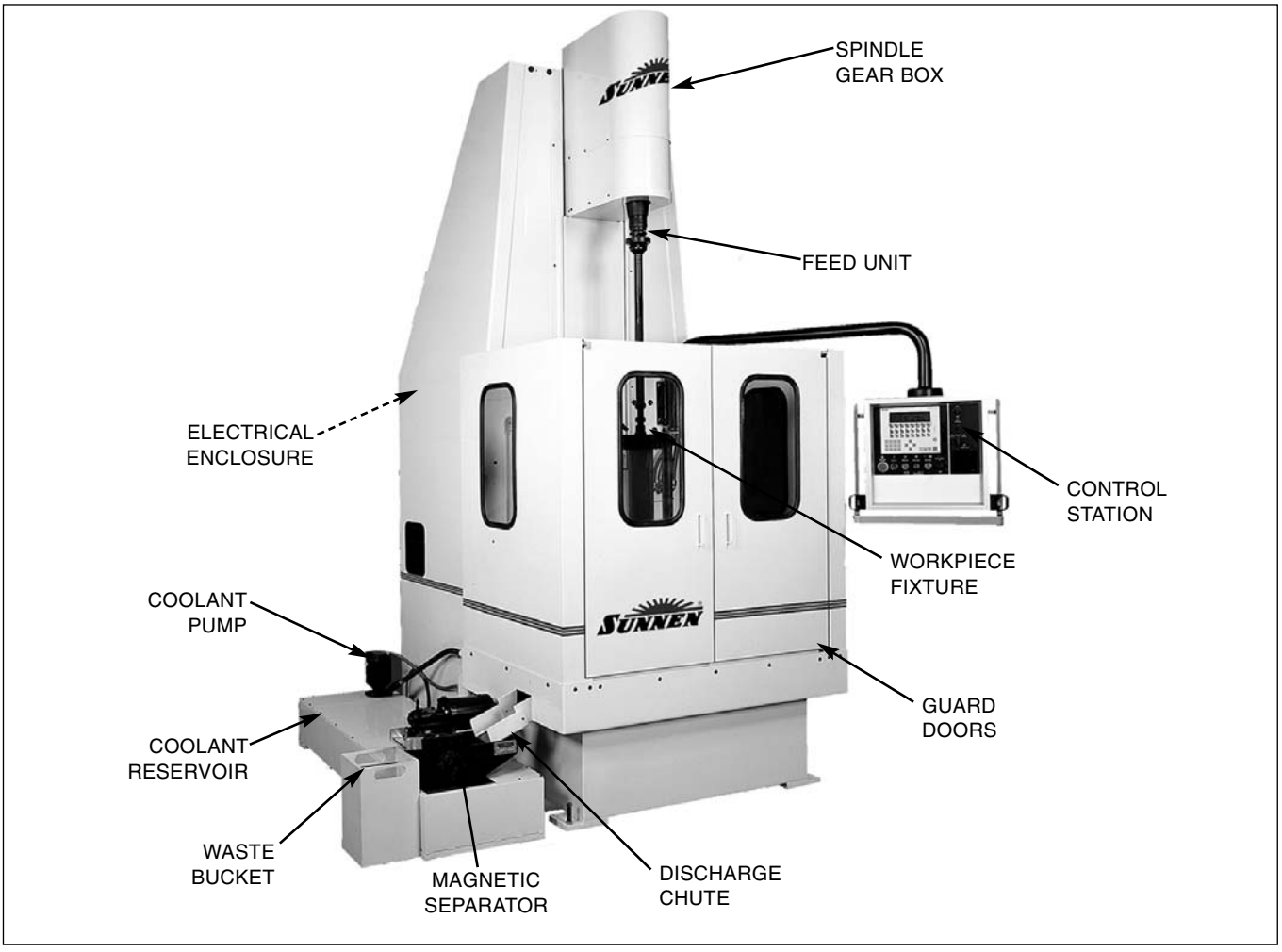


FIGURE 2-1, Major Components

SECTION 2
PREPARING FOR OPERATION

GENERAL
Consult this section when preparing Machine for operation.

MAJOR COMPONENTS
For location of major components on machine (see Figure 2-1).

EMERGENCY SWITCHES
For location of major all electrical Emergency Switches on machine (refer to Figure 2-1).

CONTROLS
For location of controls see Figure 2-3; and refer to Table 2-1 thru 2-2 for function of controls.

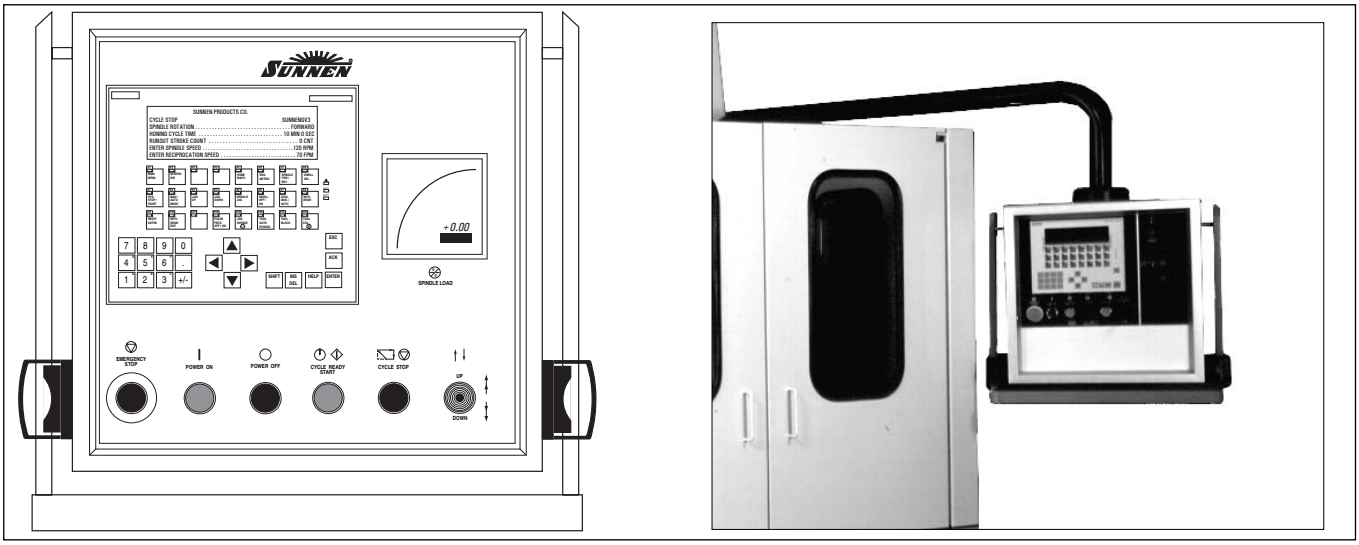


FIGURE 2-2, Controls

TABLE 2-1, Operator Controls (Buttons & Switches)

SYMBOL	DESCRIPTION	FUNCTION
	EMERGENCY STOP (Red) Pushbutton	Shuts-OFF all power to the machine functions. Button must release, before Power ON button can be pushed.
	POWER ON (Green) Pushbutton	Turns ON control power to the machine. After E-Stop Button is pushed; Power ON button must be pushed once to reset E-Stop Relay and again to turn ON Control Power.
	POWER OFF (Red) Pushbutton	Shuts-OFF control power to the machine.
	CYCLE READY/START (Green) Pushbutton	Flashes when conditions have been met to start a honing cycle. On CE models, serves as the cycle start pushbutton; light stays on while in cycle.
	CYCLE STOP (Red) Pushbutton	Stops honing cycle. All counters hold their count and cycle can be resumed at place where cycle was interrupted.
	UP / DOWN 3-Way Joystick	Used to move spindle carriage in either direction. To short stroke tool at either end of bore or anywhere in workpiece used joystick to hold or reverse direction of travel.
	CYCLE START OPTO SWITCHES (U.S. Domestic Models)	Two optically isolated switches that must be operated simultaneously in order to start a honing cycle. They are located on either side of the operator's console.
	SPINDLE FEED Load Meter	

TABLE 2-2, Operator Interface

SYMBOL	DESCRIPTION	FUNCTION
	F1 MAIN MENU Touch Button	Press to access MAIN MENU. (NOTE: Hitting the escape key will return to previous screen.)
	F2 SCREEN DIR. Touch Button	Press to access SCREEN DIRECTORY. Operator can access any screen by cursing to desired screen and pressing ENTER.
	F3 Touch Button	Various functions - Screen Dependent.
	F4 Touch Button	Various functions - Screen Dependent.
	F5 HOME MACHINE Touch Button	Press to automatically move Spindle Carriage to Home In manual mode, causes machine to re-zero encoder to PLC.
	F6 ENG. / METRIC Touch Button	This will convert units of measurement to English or Metric system.
	F7 SPINDLE FWD./REV. Touch Button	This is a screen sensitive key and is only active while in spindle screen. Press to alternate spindle direction display between forward and reverse. Selects rotation of spindle head. Can only be changed while machine is not in cycle.
	F8 DWELL SEL. Touch Button	This is a screen sensitive key and is only active while in reciprocation screen. Press to display dwell position (top, bottom or both. Used in conjunction with K6 (Dwell Off/On). If dwell is turned on, honing tool will dwell at selected position.
	K1 HYD. STOP/START Touch Button	Press to turn hydraulic system either ON or OFF depending on its current status.
	K2 MAN/AUTO MODE Touch Button	Press to select operating mode of machine. MAN: Used joystick to move spindle carriage. AUTO: Required to initiate “Cycle Ready/Start.”
	K3 JOG UP Touch Button	Press to move spindle carriage in upward direction.
	K4 JOG DOWN Touch Button	Press to move spindle carriage in downward direction.
	K5 SPINDLE JOG Touch Button	Press to initiate spindle for short intervals. Cause spindle to rotate in the selected direction at a slow speed.
	K6 DWELL OFF/ON Touch Button	Press to initiate dwell status. Used in conjunction with dwell position selected “on” reciprocation screen. LED associated with this function key indicates current status with LED “on” meaning that dwell function is on.
	K7 COOL MAN/AUTO Touch Button	Press to select operation of coolant pump. MAN: Coolant flows continuously. AUTO: Coolant flows only during honing cycle. (Machine defaults to automatic.)
	K8 WITHDRAW Touch Button	Press to interrupt honing cycle and stroke counter. Ends honing cycle. Resets all timers and counters. Depressing again will cause tool to move to withdraw position.
	K9 RESET CNTRS Touch Button	Press to reset cycle timer and stroke counter to their default settings.

NOTE: “K” function button LED indicators are on for a function operating or for the second function of a dual function key.

TABLE 2-2, Operator Interface (Cont'd)

SYMBOL	DESCRIPTION	FUNCTION
	K10 WITHDRAW / EXIT Touch Button	Press to withdraw honing tool to mouth of bore. Tool will jog up to second withdraw position with spindle rotating at jog speed Ends honing cycle. Resets all timers and counters.
	K12 PULSE FEED OFF/ON Touch Button	Press to turn pulse feed option ON or OFF, depending on current status as indicated by LED. ON: Honing tool will expand for time set on tool feed screen and will then go into a blocked condition for amount of time set on tool feed screen. Process will continue until cycle times out and run out stroke counter starts.
	K13 JOG EXPAND Touch Button	Press to expand honing tool. (Will not function if an auto expand cycle is activated.)
	K14 TOOL AUTO EXPAND Touch Button	Press to automatic feed honing tool upon cycle start.. (Otherwise tool will start up in a blocked condition.)
	K15 TOOL BLOCK Touch Button	Press for honing tool to stay in a blocked condition, meaning tool will neither expand or collapse. An automatic cycle will start up in this condition unless operator selects another option.
	K16 TOOL COL. Touch Button	Press to collapse honing tool.
	SHIFT Touch Button	Used in conjunction with Numeric (Alpha) Keypad to switch to enter letters. Because of limited space, if letter is not shown, press last letter shown and use arrows to select letter.
	INS DEL Touch Button	
	HELP Touch Button	Button will light when operator entry screen for which there is a help screen. Pressing button will take operator to help screen. Press ESC button to return to previous screen.
	ENTER Touch Button	Pressing this button enters operations and entries that require this function.
	ACK Touch Button	If an alarm appears on screen then operator presses this button acknowledge alarm and return to operations screen. Red light will remain lit until condition is cleared.
	ESC Touch Button	Escape: Press to return to previous screen or step.
	FEED IN PROGRESS LED	Indicates tool is feeding. (Also see K9 and K10 Buttons.)
	SHIFT LED	Indicates that Shift Button has been pressed. (See Shift Button.)
	HELP LED	Indicates that help screen is available for present screen. (See Help Button.)
	(CAUTION) LED	Indicates that an alarm has sounded. (See ACK Button.)
	CURSOR KEYS	Arrows: Used in conjunction with other keys/buttons. Used to move cursor on display screen.
	NUMERIC (ALPHA) KEYPAD	Used to enter numbers. Using Shaft Button allows operator to enter letters. Press last letter and use up arrow to scroll to desired letter and press enter.

NOTE: "K" function button LED indicators are on for a function operating or for the second function of a dual function key.

TABLE 2-3, Safety Symbols

SYMBOL	DESCRIPTION	FUNCTION
	Warning Label	Warns that an electrical hazard exists.
	Warning Label	Warns that safety glasses should be worn at all times when operating this machine.
	Warning Strip	Warns that a *physical hazard exists*, and that proper precautions should be taken.
	Label	Designates this machine is *"CE" compliance*.
	Warning Label	Warns that a *hazard from objects falling off work table* exists and that proper precautions should be taken.
	Warning Label	Warns not to hold workpiece in hand without a torque resisting fixture.

SAFETY SYMBOLS

For a description of safety symbols used on this machine refer to Table 2-3.

WORKHOLDING FIXTURE

Position the Workholding Fixture as follows:

1. Loosen Clamps (see Figure 2-3).

2. Position Fixture so Workpiece will be clamped close to its Ends (approx. 400 mm).

3. Measure distance of workpiece to be honed.

4. Lift Workpiece into Machine, using a hoist as required.

5. Lower Workpiece into place on Fixture.

6. Align Workpiece with Fixtures. Position Fixtures as required. Workpiece should be clamped between 300-500 mm from its Ends for best Results.

7. Adjust height of Top of Workholding Fixtureusing operator controls.

8. Tighten Clamps.

HONING TOOL

Assembly and install Honing Tool per instructions packaged with Tooling.

Rotary Tool

1. Assemble Honing Tool (see Figure 2-4).

2. Install drive adapter in spindle by sliding lock collar up and inserting spindle adapter shank (see Figure 2-5). (Take care to align square feed rod of spindle adapter with square socket of feed rod inside of spindle.)

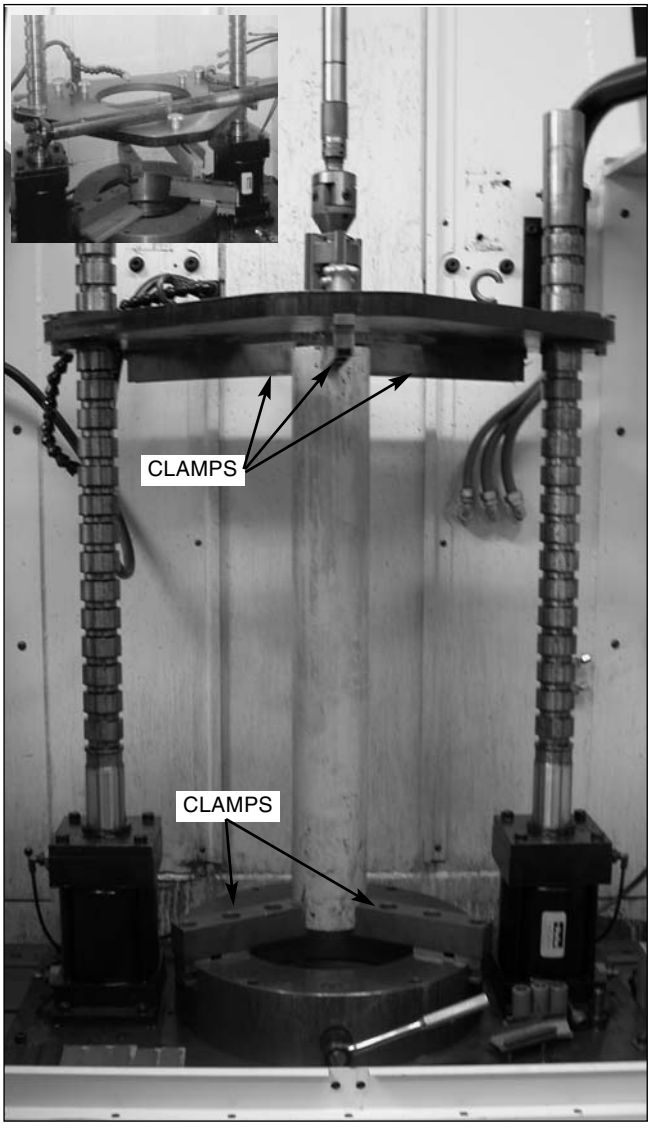


FIGURE 2-3, Fixture

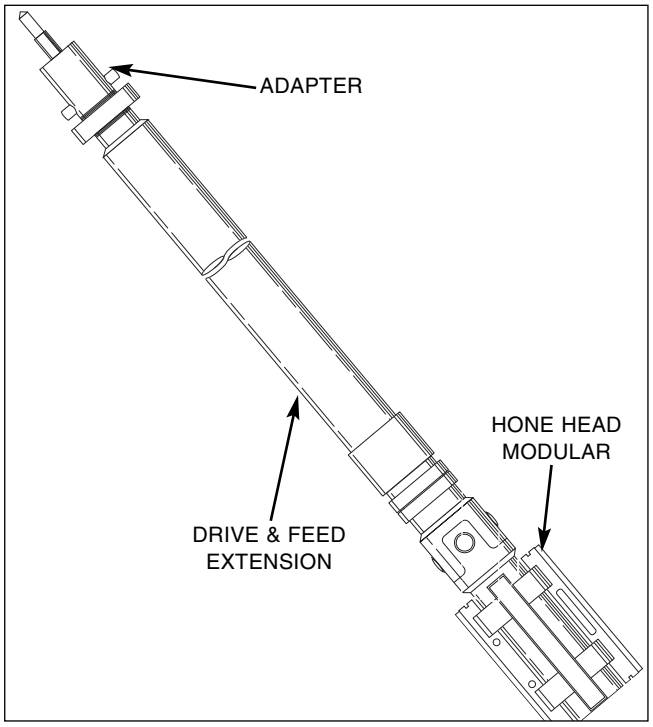


FIGURE 2-4, Honing Tool

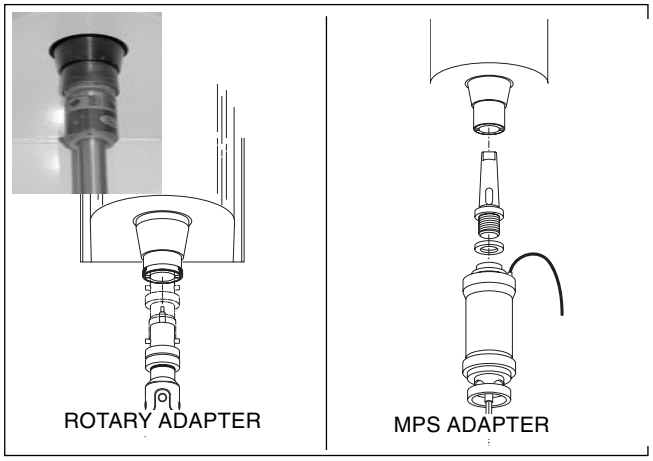


FIGURE 2-5, Drive Adapter

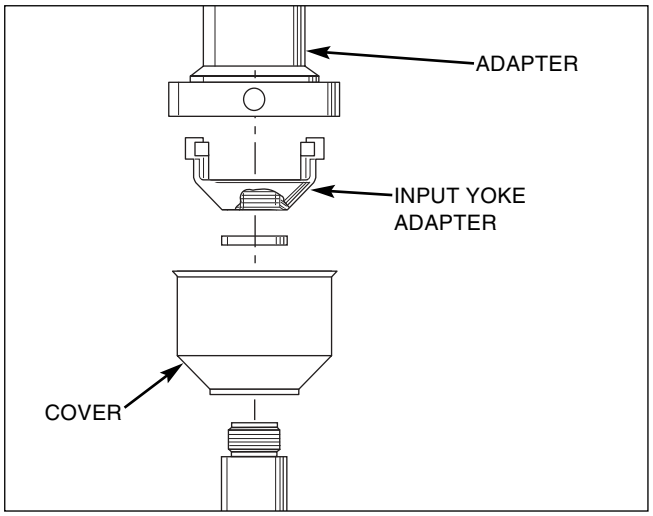


FIGURE 2-6, Input Yoke Adapter (MPS)

3. Rotate spindle adapter to engage drive pins in bayonet slots and install reversing keys.

4. Tighten lock nut.

MPS Tools

1. Assemble Honing Tool (see Figure 2-4).

2. Install drive adapter in spindle by sliding lock collar up and inserting spindle adapter shank (see Figure 2-5).

3. Install MPS Feed Unit (see Figure 2-5).

4. Align Input Yoke Adapter on Honing Tool with Drive Ring on Feed Unit, and guide adapter onto Hex Shaft (see Figure 2-6).

5. Rotate input Yoke Adapter (clockwise) to engage and Lock into Drive Ring on Spindle Nose.

6. If supplied: Slide Universal Cover over Input Yoke Adapter.

NOTES

SECTION 3
SETUP & OPERATION

GENERAL

This section describes a step-by-step operating procedure for Machine.

• Prior to starting Machine, Operator shall ensure:

• All prerequisites described in sections 1 and 2 are complete.

• All personnel are clear of machine.

SAFETY PRECAUTIONS

The following precautions should be followed to ensure maximum safety of personnel while working on or around Machine.

• DO NOT operate machine while lifting devices are installed.

• Ensure workpiece is securely fixtured and located before operating.

• Ensure all guards are in place before operating.

• Ensure area is clear of other personnel before operating machine.

• Keep machine clear of tools or other foreign objects.

• Wear proper safety items such as, safety glasses, gloves, non-slip safety shoes and other personal safety equipment as necessary or required.

• DO NOT wear loose clothing or jewelry while working on or around machine.

• Keep area around machine free of paper, oil, water and all other debris at all times.

• When lifting part or tooling use proper lifting procedures. DO NOT overreach; keep proper footing and balance at all times.

• CE Push E-STOP Button and turn OFF electrical power at Disconnect Switch, on Electrical Enclosure when preforming service not requiring power.

• CE Turn OFF electrical power at Main Power Source when preforming maintenance on, or cleaning of Electrical Control Enclosure.

• Clear area of excessive lubricant or lubricant spills.

• DO NOT adjust stroke length while Spindle Retractor Carriage is not in locked position.

• KEEP hands clear of all moving parts. Stay clear of all moving parts.

• Remove keys and wrenches from machine before honing.

• DO NOT operate machine with tool support bar in load position.

• To avoid personal injury, allow spindle and stroking arm to come to a complete stop before removing part.

• Keep all visitors a safe distance from work area.

• DO NOT use in dangerous environment. DO NOT use machines in damp or wet locations, or expose them to rain. Keep work area well lighted.

• IT IS DANGEROUS to rotating parts, such as, drive shafts and honing tool during operation.

SV3

• All operational information must be read and understood before operating equipment.

• Observe all caution labels1tags on machine.

• Make no adjustments to hydraulic or electrical systems of machine while machine is powered unless you are a fully qualified repair technician.

• When electrical panel(s) is (are) opened, all power must be disconnected and locked out prior to initiating any modifications or repairs.

• Never leave machine unattended while it is running.

• Stay clear from any areas of machine that are painted "SAFETY" yellow.

OPERATING HINTS

There are several features on the STH Machines for correcting problems in the bore. These features are as follows:

1. During honing cycle, the Short Stroke Joystick can be used at any time to reduce “Tight Spots”.

2. Additionally, the Short Stroke Joystick can be used to stop or oscillate the stroke at either end of the bore, for correcting barrel or bellmouth conditions.

3. Ability to dwell at either or both ends.

4. Auto short stroke at blind end of bore. Opens up blind end, then goes into regular cycle.

START-UP & OPERATION

1. Assemble and install Honing Tool (refer to Section 2).

2. Turn ON power at Main Power Disconnect Switch, on Electrical Enclosure.

3. Release all Emergency STOP Buttons. Also insure Carriage is in locked position.

4. Press Power ON Button. If Main Power has been cycled, press Power ON Button twice.

NOTE: Machine automatically comes up in Manual Mode when power is turned ON.

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5. Press ACK Button to acknowledge message: "Re-Zero Machine - Re-Home Servo."

6. Press K5, Home Machine on Control Panel.

7. If required: Press K2, Man/Auto Mode Button until LED is OFF.

8. Press K1, Hyd. Stop/Start to START hydraulic unit.

9. Press K16, Tool Col. to fully collapse tool.

10. Go to 02 RECIPROCATION screen.

CAUTION

Remember that when jogging down, spindle carriage will move at a slow speed for first three seconds and then will change to jog speed rate set on Reciprocation Screen.

10. Inch down until honing tool is in desired full withdraw position, but has not yet entered the bore.

11. Enter this position in ENTER WITHDRAW POSITION field using RECIPROCATION POSITION display as a reference.

Cursor down to ENTER WITHDRAW POSITION and enter position, using numeric keypad. If a decimal point is needed it must be entered from keypad (28.5).

12. Jog tool down until approximately 1/3 of Stone length is visible out top of Workpiece, to allow for overstroke. Enter UP-GO-DOWN POSITION.

13. Continue to jog tool down, until approximately 1/3 of Stone length is visible out bottom of Workpiece. Enter DOWN-GO-UP POSITION.

13. If required: Enter DWELL TIME.

14. Press F2, Screen Dir. Cursor down to 03 SPINDLE and press Enter.

15. Enter desired SPINDLE ROTATION DIRECTION by toggling F7.

16. Press F2, Screen Dir. Cursor down to 04 TOOL FEED and press Enter.

17. Enter desired PULSE FEED ON / OFF TIMES.

18. Press F2, Screen Dir. Cursor down to 05 TIMER/COUNTER and press Enter.

19. Enter desired amount of time for HONING CYCLE and desired amount of counts for RUNOUT CYCLE.

20. Press F1, Main Menu. Next.

21. Jog tool up and out of bore until the TOOL IN WITHDRAW message appears.

22. Enter desired SPINDLE SPEED and RECIPROCATION SPEED. (See Appendix X, Spindle Speed Chart.)

23. Select any options needed, such as K6 Dwell or K12 Pulse Feed, using Keypad.

CAUTION

Ensure honing tool is collapsed.

24. Press K16, Tool Col. to fully collapse tool.

25. Press K4, Jog Down, to inch tool down into workpiece bore.

26. Press K13, Jog Expand to expand stone in workpiece bore; hold until all stones contact bore wall. Shaking Honing Tool keeps hone from binding in bore while stones are being fed out.

27. Close guard doors.

28. Recheck all values entered in Control Panel.

29. Press K2, Man/Auto Mode, until LED is ON. This indicate machine is in automatic mode. At this point, the Cycle Ready / Start Button will be illuminated indicating that all conditions have been met to start a honing cycle.

30. Depress CYCLE START OPTO SWITCHES, on sides on Operator Control Console simultaneously to initiate A honing Cycle.

CE Models: Press Cycle Ready/Start Button to initiate A Honing Cycle.

NOTE: At this point machine should start reciprocating between the reversal points, spindle should be rotating, tool should be expanding (if selected), and cycle timer should be counting down to.

At any time during cycle operator may hit cycle stop and cycle will interrupt. Counters will hold their count unless cycle is terminated.

The operator may also press K10, Withdraw / Exit and honing tool will exit bore and stop at withdraw position and cycle will end.

The operator may also press K8, WIthdraw and honing tool will stop just above up-go-down position. A second pressing of K8 will allow carriage to exit to withdraw position.

At any time during cycle, spindle and reciprocation speeds may be changed. Change will take place immediately.

Honing Tool will continue to feed stones out, to maintain load set by Feed Knob, until Honing Cycle Time reaches zero "0". At that point, the stones stop feeding out and remain in a blocked position until Run Out Stroke Counter reaches zero "0" and Honing Cycle ends.

NOTE: After the honing timer and the stroke counter have both reached zero, the honing tool will stop at the up-go-down reversal point or exit the part, depending on the withdraw default selected on the Maintenance Screen. Again, a second pressing of K8 will cause the tool to exit the second withdraw position if the "MANUALLY" withdraw default is selected.

NOTE: Pressing Red E-STOP Button will Shut OFF power to all machine functions. After E-STOP Button has been pressed: E-STOP Button must be released, POWER ON Button must be pressed twice before machine will operate. Also, K9-FEED RETRACT-Button must be used so that stones will not be under pressure before machine can be restarted. When honing cycle is interrupted Timer resets itself.

31. Press K2, Manual/Auto Mode Button, until LED is OFF.

32. Retract stones slightly by pressing K9, Feed Retract Button.

33. Swing Tool Support into Load Position.

34. Press K12, Carriage Release Down Button and slide spindle carriage to the left.

35. Slide Honing Tool out of Bore.

36 Repeat the previous process to start a new honing cycle

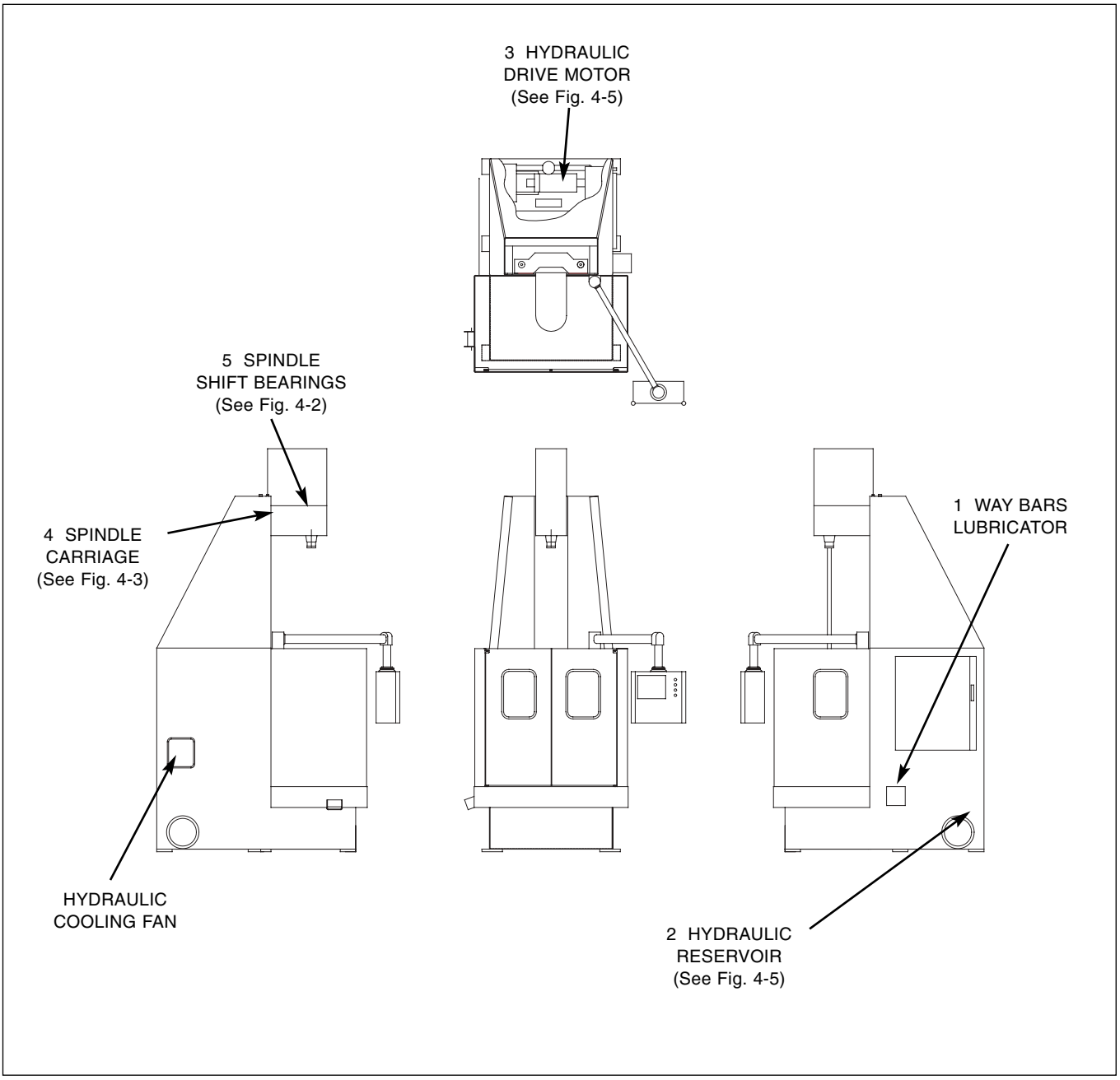


FIGURE 4-1, Lubrication Points

TABLE 4-1, Lubrication Points

ITEM	DESCRIPTION	LUB. POINT	LUB. PROCEDURE	LUB. CODE	INTERVAL
1	Machine Base	Way bar Lub. Reservoir	Fill	2	As Req. Check
2	Hyd. System	Hyd. Reservoir Drive Unit	Fill	1	Check Weekly As Req.
3		Hyd. Drive Motor		4	6 Mths
4	Spindle Carriage	Gearbox		3	6 Mths
5	Spindle Shft Brgs			5	6 Mths

Lub. Code Commercial
1 - Standard Oil Co., Energol Blp-46
2 - Standard Oil Co., Sulkleer 102s
3 - Mobil Shc629 Synthetic Oil
4 - Shell Bearing Grease - Cyprina #3
5 - Standard #Mk-1 Bearing Grade #1

SECTION 4
ROUTINE MAINTENANCE

GENERAL

The following procedures and suggested maintenance periods are given as guides only and are not to be construed as absolute or invariable. Local conditions must always be considered. Each machine must be maintained individually according to its particular requirements.

WARNING

Turn OFF electrical power when performing service on your machine, which does not require power. Disconnect Machine from main power supply before any work is performed inside of Electrical Enclosure.

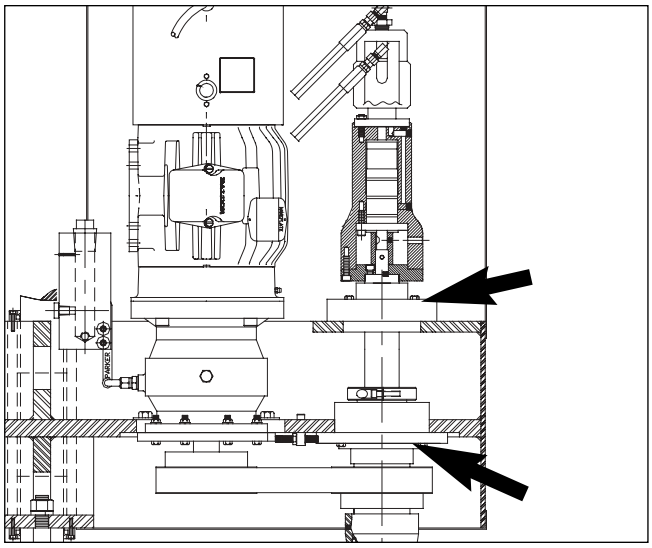


FIGURE 4-2, Spindle Bearings

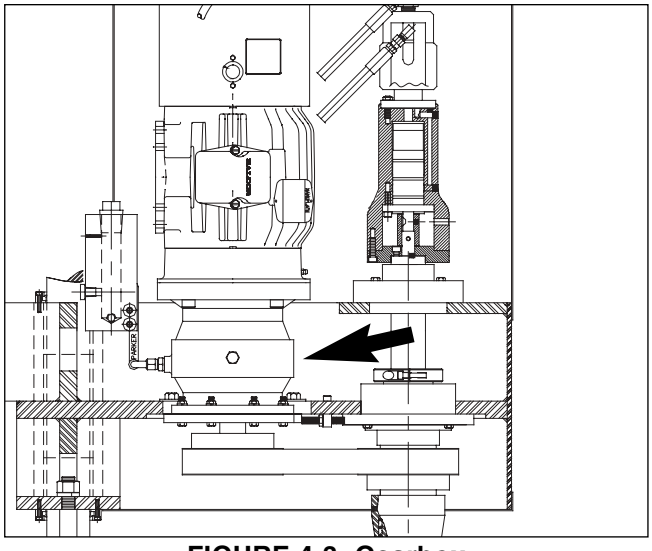


FIGURE 4-3, Gearbox

CLEANING

Daily: Wipe exterior of Machine with a clean dry cloth.

Monthly: Wipe exterior of Machine with a clean dry cloth; Wash exterior of Machine with warm water and a mild detergent (or mild industrial solvent); Rinse thoroughly with clean hot water; Wipe dry with a clean dry cloth.

LUBRICATION

Hand lubricate various machine components called out in below (see Figure 4-1 & Table 4-1).

NOTE: The intervals between lubrication will vary with amount of use your Machine receives. Lubricate all components at least once every six months.

CAUTION

Be careful not to get oil on drive belts, pulleys, or brake strap.

1.Remove spindle carriage top cover and lower belt cover.

2. Lubricate lower spindle bearing at grease fitting behind pulley (see Figure 4-2). (lube code #5)

3. Lubricate upper spindle bearing. (lube code #5)

4. Lubricate spindle motor bearings. (lube code #5)

5. Spindle Motor Gearbox (see Figure 4-3): When Spindle Drive is not running, check lubricant level in Sight Glass on fill tube. Fill as required. Fill tube is accessible from inside machine column. (lube code #3)

6. Check way bars for lubrication film and wear (see Figure 4-4): Wipe Bars with a clean soft cloth. Fill way bar lubricator as required. (lube code #2)

7. Replace all covers to ensure safe operation.

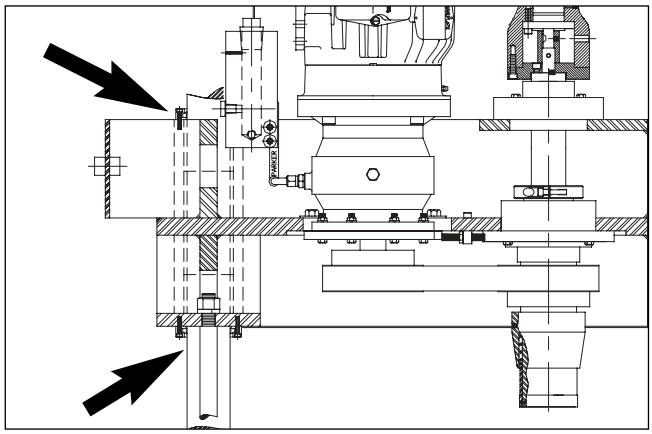


FIGURE 4-4, Way Bars

HYDRAULICS

CAUTION

Any Hydraulic Oil used for filling Hydraulic Reservoir, or Priming or Filling Pump and Motor Cases *Must* be filtered thru 10 Micron Filter.

1. Check hydraulic oil system level at sight gauge on side of machine (see Figure 4-5). Fill as required (lube code #1).

NOTE: Change Hydraulic Oil In Reservoir Once Each Year.

2. Hydraulic system filters are monitored electrically and will provide a warning on operators display screen when maintenance is required.

NOTE: Change Filter a minimum of every Six Months, or sooner as indicated on screen.

3. Grease hydraulic system electric drive motor. (lube code #4)

4. Check hydraulic system cooling fan and radiator for debris. Clean as required. (Hydraulic system can overheat if it is overly dirty.)

NOTE: Clean a minimum of Twice A Year. Blow Air Into Coils To Clean. (Hydraulic system can overheat if it is overly dirty.)

COOLANT RESERVOIR

Clean Coolant Reservoir and Replace Coolant as follows (see Figure 4-6):

1. Direct one or more Coolant Nozzles into an approved waste container.

2. Open Coolant Control Valves.

3. Press K5, Cool Man/Auto Button, turn pump ON and pump waste Coolant into waste container.

4. As Coolant flow drops off, press E-Stop Button.

5. Close Coolant Control Valves.

6. Disconnect Plug X5 and X6 from Connecting Panel.

7. Remove Drain Tube and disconnect oil fitting, then slide Reservoir out from Machine.

8. Take out Magnetic Filter from Reservoir.

9. To remove Coolant that was not pumped out by Pump, remove Drain Plug on front of Reservoir

10. Drain and clean Reservoir.

11. Slide Reservoir under Machine

12. Connect oil fitting, then install Drain Tube and connect Plugs X5 and X6.

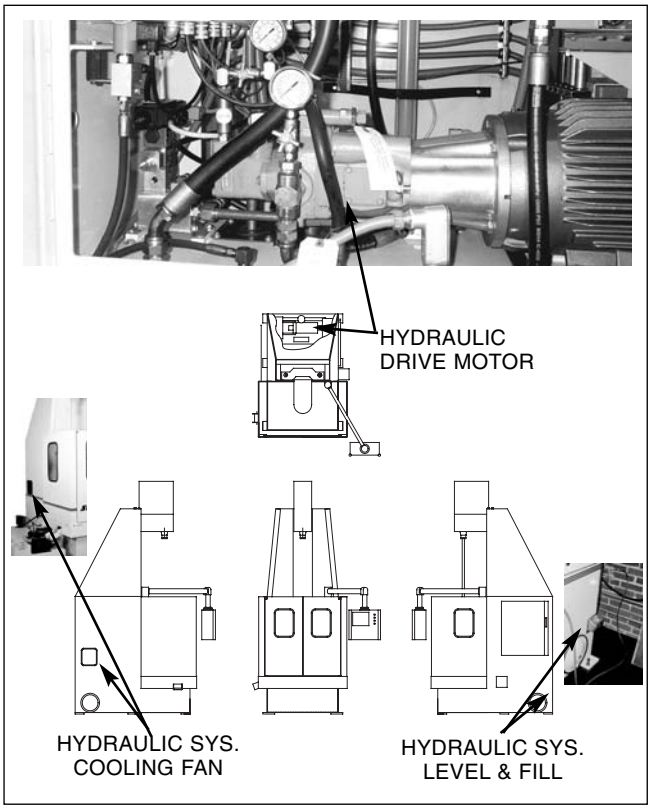


FIGURE 4-5, Hydraulics

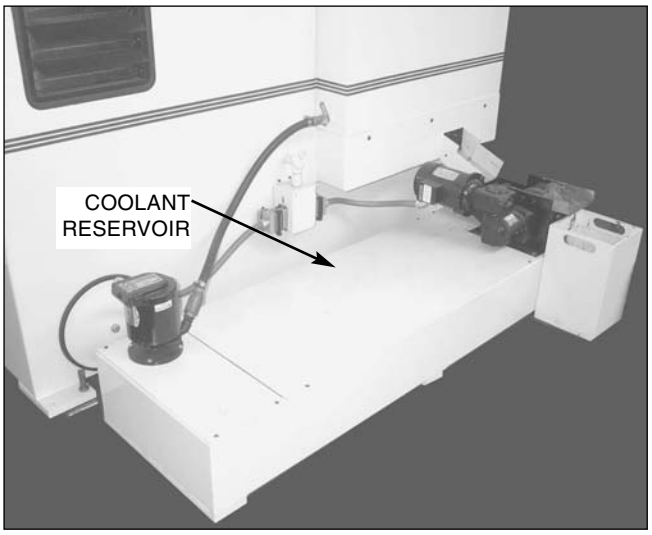


FIGURE 4-6, Coolant Reservoir

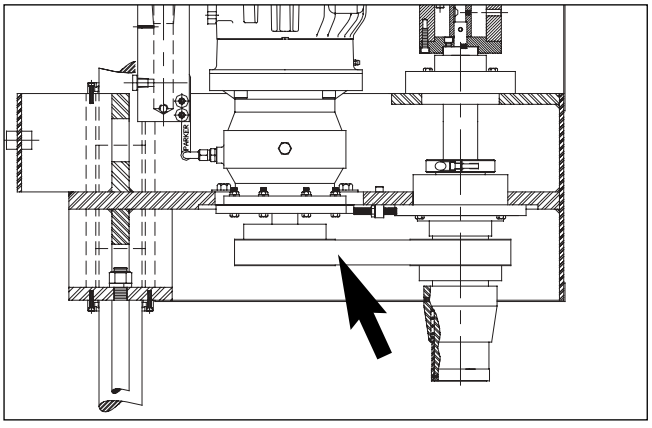


FIGURE 4-7, Drive Belt Tension

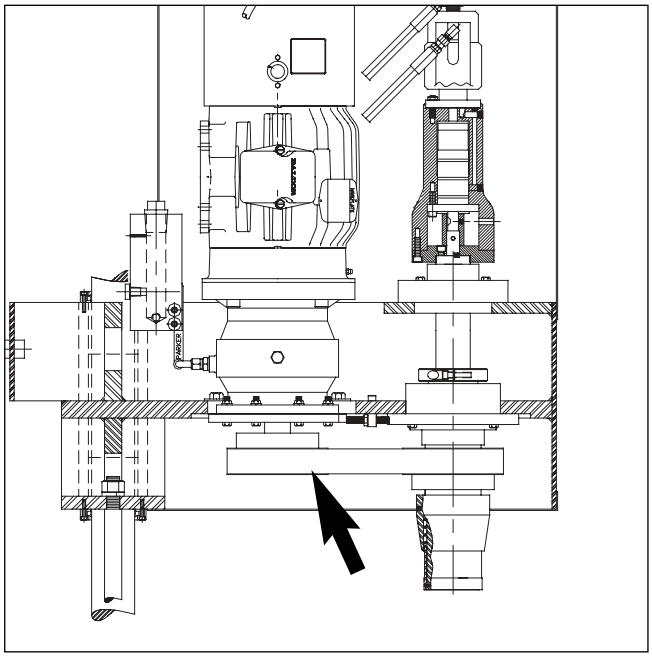


FIGURE 4-8, Drive Belt Replacement

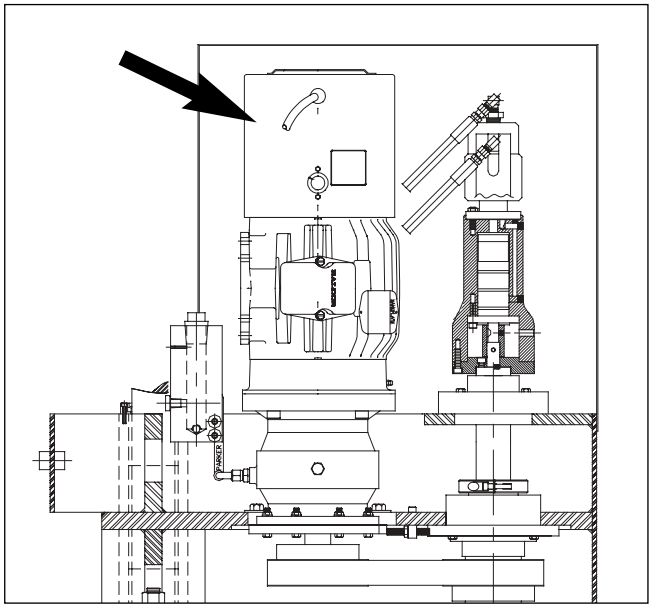


FIGURE 4-9, Coolant Fan

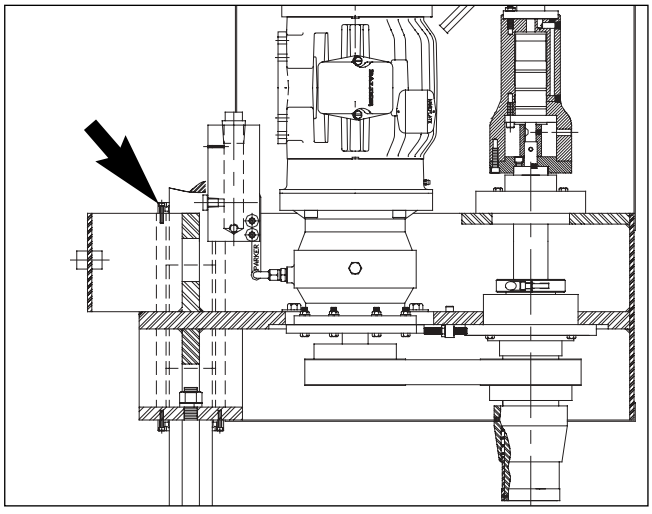


FIGURE 4-10, Wipers

DRIVE BELT TENSION

Check drive belt tension on a regular basis to be sure Belts are not loose. Belts should have no more than 1/8 in. (3,18 mm) deflection measured halfway between pulleys (see Figure 4-7). Adjust as required:

CAUTION

Keep Belts properly tightened and adjusted for correct operation of machines.

1. Turn OFF power to Machine at Master ON/OFF Switch, on Electrical Enclosure.

2. Remove spindle carriage top cover and lower belt cover.

3.

Adjust Belt Tensioning Screw as required to get a belt deflection of 3,5 mm per 100 mm of span when a 60 N load is applied (.035 in per inch of span when a 13.5 lb. load is applied).

5. Replace all covers to ensure safe operation.

DRIVE BELT REPLACEMENT

Check drive belt for wear (see Figure 4-8). To replace belt, proceed as follows:

1. Turn OFF power to Machine at Master ON/OFF Switch, on Electrical Enclosure.

2. Remove spindle carriage top cover and lower belt cover.

3. Loosen two (2) Hex Head Capscrews in the Motor Mounting Block to release belt tension.

4. Remove old Belt.

5. Install new Belt.

6. Pull up on Motor to adjust Belt Tension and tighten Hex Head Capscrew in Motor Mounting Block.

7. Replace all covers to ensure safe operation.

8. Turn ON power at Master ON/OFF Switch.

COOLANT MOTOR

Check cooling motor fan on top of spindle drive motor for proper operation (see Figure 4-9). Clean as required.

WIPERS

Check way bar wipers (see Figure 4-10). Replace as required:

1. Turn OFF power to Machine at Master ON/OFF Switch, on Electrical Enclosure.

2. Remove spindle carriage top cover and lower belt cover.

MAGNETIC SEPARATOR (Optional)

The magnetic separator should be checked, cleaned, and adjusted as follows (see Figure 4-11):

NOTE: For complete maintenance instructions, refer to instructions packaged with Magnetic Separator.

---

1. Water-Based Coolant: Clean discharge chute daily. When using water-based coolant, the sludge that builds up in the chute often hardens if the machine is turned off for 8 hours or more. Therefore, the sludge should be cleaned off the chute at the start of each shift. When using honing oil as a coolant, the sludge rarely if ever hardens in the chute and will not have to be checked as often.

NOTE: A certain amount of coolant will be carried into the sludge bucket along with the sludge. After gravity separates the coolant from the sludge, there is normally an inch or more of coolant that collects in the bucket. This coolant can be dipped out and returned to the reservoir.

---

3. Periodically: Drain Inlet Hopper, wipe clean, and adjust Gap Plate as required. Proper Gap setting is 4,5 mm ±1 mm (3/16 in ±1/16 in).

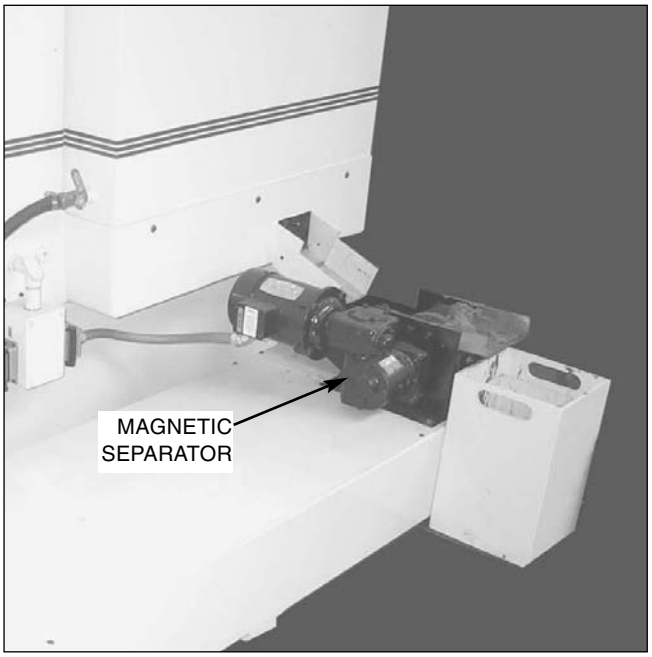


FIGURE 4-11, Magnetic Separator

SECTION 5
TROUBLESHOOTING

GENERAL

This section contains Troubleshooting information in table form, which should be used when problems occur with machine. The table lists problems encountered, possible causes, and solutions for problems along with reference to section of manual where detailed instructions may be found to correct problems.

OPERATIONAL TROUBLESHOOTING

For suggestions on correcting problems with bore conditions or with honing operation; consult Table 5-1.

TABLE 5-1, Operational Troubleshooting Index

PROBLEM	PROBABLE CAUSE	SOLUTIONS	SEC.
Stone not cutting	1. Stone Glazing	A. Dress stone	
		B. Increase cutting pressure	
		C. Increase stroking speed	
		D. Use softer stone	
		E. Check coolant*	4
	2. Stone Loading	A. Dress stone	
		B. Increase stroking speed	
		C. Use softer stone	
		D. Use coarser stone	
		E. Check coolant*	4
	3. Load Meter needs calibration.	A. Calibrate Load Meter	3
Slow stock removal	1. Improper spindle speed	A. Increase spindle speed	
	2. Inadequate stone feed up	A. Increase cutting pressure	
	3. Improper stone	A. Use softer stone	
		B. Use coarser stone	
	4. Improper or diluted coolant*	A. Check coolant*	4
	5. Load Meter needs calibration.	A. Calibrate Load Meter	3
Poor stone life	1. Excessive stone feed up	A. Decrease cutting pressure	2
	2. Inadequate spindle speed	A. Increase spindle speed	2
	3. Improper stone	A. Use harder stone	
		B. Use coarser stone	
	4. Improper or dilute coolant*	A. Check coolant*	4
	5. Load Meter needs calibration.	A. Calibrate Load Meter	3
Bellmouth (Bore longer than 2/3 stone length)	1. Mandrel not trued	A. True stone & shoes	
	2. Short or unbalanced part	A. Shorten stroke length	2
	3. Improper stone	A. Use softer stone	
	4. Improper stone length	A. Shorten stone only slightly on each end	
Bellmouth (Bore shorter than 2/3 stone length)	1. Mandrel not trued	A. True stone & shoes	
	2. Short or unbalanced part	A. Shorten stroke length	2
	3. Improper stone	A. Use softer stone	
	4. Improper stone length	A. Shorten stone & shoes equally to 1-1/2 times bore length	

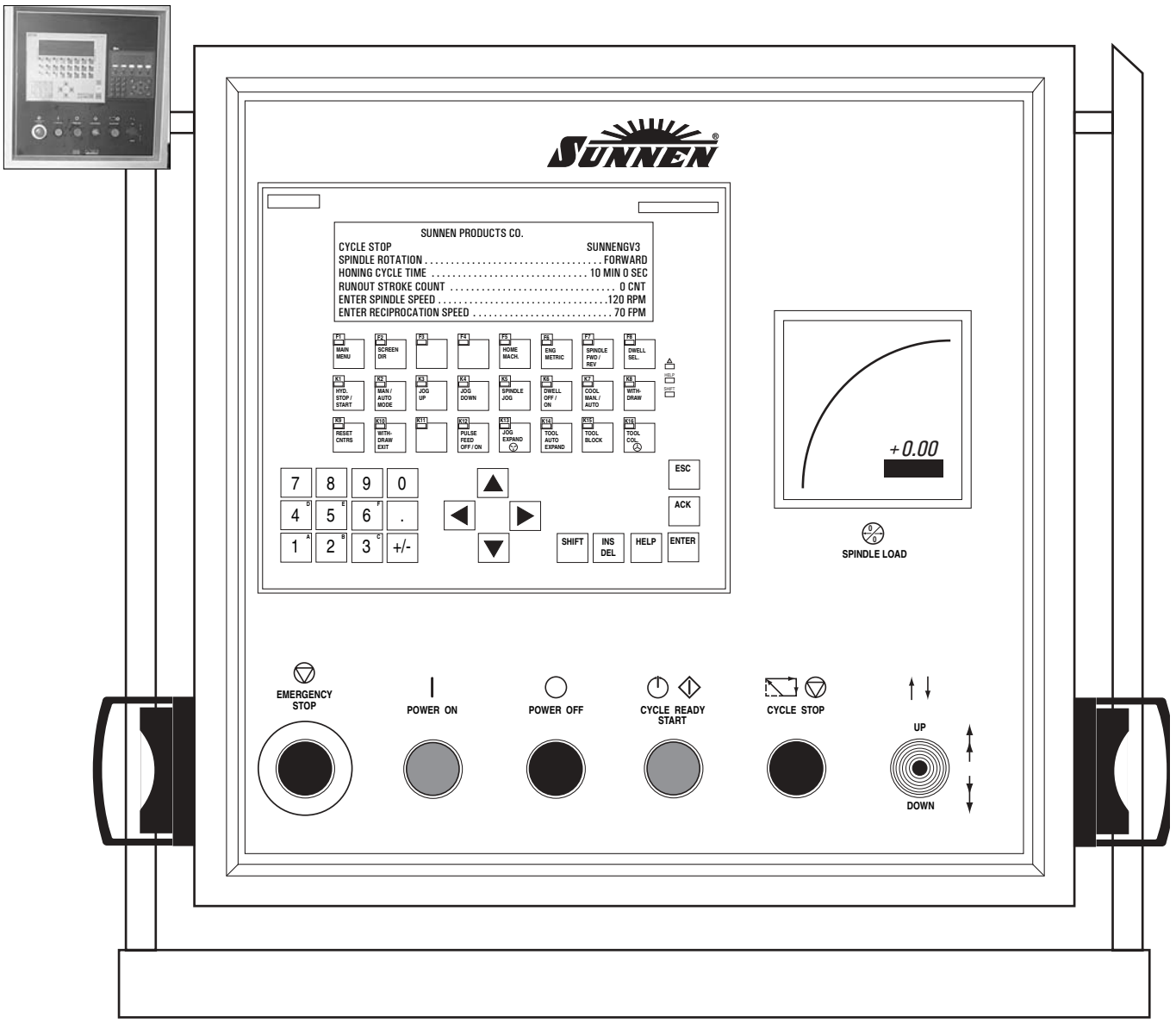
*NOTE: Many honing problems, such as poor stone life, and rough finish, are caused by wrong coolant; insufficient coolant, dirty coolant, or contaminated coolant. Use ONLY clean, Sunnen Industrial Honing Oils or Water-Based Coolant. Make sure that coolant is neither diluted nor "cut" with other coolants. Keep solvents and cleaning fluids away from Machine.

PROBLEM	PROBABLE CAUSE	SOLUTIONS	SEC.
Barrel	1. Mandrel not trued	A. True stone & shoes	
	2. Improper stone length	A. Use longer stone or shorten guide shoes on both ends	
		B. Use mandrel with longer stone & shoes	
	3. Improper stone	A. Use finer stone	
Taper in Open Hole	1. Workpiece is not being reversed	A. Reverse workpiece on mandrel	
	2. Mandrel not trued	A. True stone & shoes	
	3. Improper stroke	A. Lengthen overstroke on tight end	
	4. Stroker Arm and Spindle not aligned	A. Align Stroker Arm and Spindle	
Taper in Blind Hole	1. Improper stone length	A. Shorten stone and shoes to 3/4 length of bore	
		B. True stone & shoes frequently	
	2. Inadequate oil flow	A. Adjust Oil Nozzle	
	3. Inadequate relief in blind end	A. Provide sufficient relief	
		B. Short stroke tight end	
		C. Use hard tip stone	
Out-Of-Round	1. Undersize honing tool	A. Change honing tool	2
	2. Mandrel not true	A. True stone & shoes	
	3. Workpiece flexing (thinwall)	A. Decrease cutting pressure	2
	4. Improper stone	A. Use softer stone	
Waviness	1. Improper mandrel or stone length	A. Use mandrel with sufficient stone length to bridge waviness in bore	
Rainbow	1. Improper mandrel	A. Use L, BL or multi-stone mandrel (stone length should be 1-1/2 times bore length	
	2. Improper stroke	A. Shorten overstroke	
	3. Improper stone	A. Use softer stone	
Rough Finish	1. Improper feed	A. Decrease cutting pressure	2
	2. Mandrel not trued	A. True stone & shoes to exact hole dia.	
	3. Improper stone	A. Use finer stone	
	4. Improper or diluted coolant*	A. Check coolant*	4
	5. Soft or exotic materials	A. Use bronze mandrel or bronze shoes	
Scratches in Bore (Random)	1. Improper feed	A. Decrease cutting pressure	2
	2. Improper stone	A. Use finer stone	
		B. Use softer stone	
	3. Improper mandrel	A. If using hard steel mandrel, change to soft steel mandrel; If using soft steel mandrel, change to bronze mandrel	
	4. Improper or diluted coolant*	A. Check coolant*	4

*NOTE: Many honing problems, such as poor stone life, and rough finish, are caused by wrong coolant; insufficient coolant, dirty coolant, or contaminated coolant. Use ONLY clean, Sunnen Industrial Honing Oils or Water-Based Coolant. Make sure that coolant is neither diluted nor "cut" with other coolants. Keep solvents and cleaning fluids away from Machine.

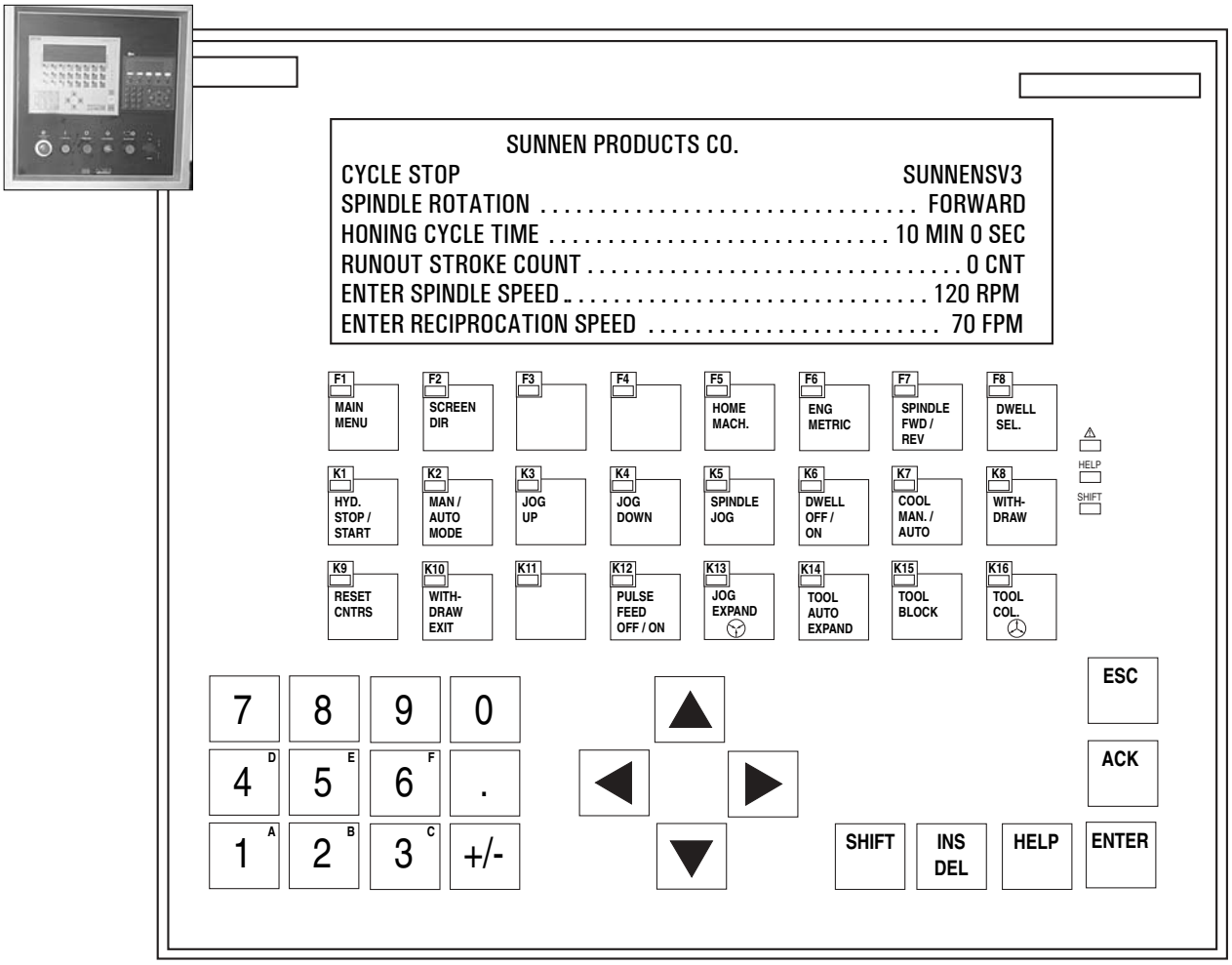
SCREENS

OPERATOR CONTROLS STATION



SCREENS

START-UP SCREEN



LINE 1: Operator entry of desired Reciprocation Rate spindle carriage will travel at, during initial three (3) seconds of INCH FORWARD or INCH REVERSE. Also Reciprocation Rate spindle carriage will travel at during HOME SERVO.

LINE 2: Operator entry of desired Reciprocation Rate spindle carriage will travel at, after initial three (3) seconds of INCH FORWARD.

LINE 3: Operator entry of desired Reciprocation Rate spindle carriage will travel at, after initial three (3) seconds of INCH REVERSE.

LINE 4: Operator entry of desired Tool Retract Time at end of cycle.

LINE 5: Calibrates Load Meter depending on spindle speed.

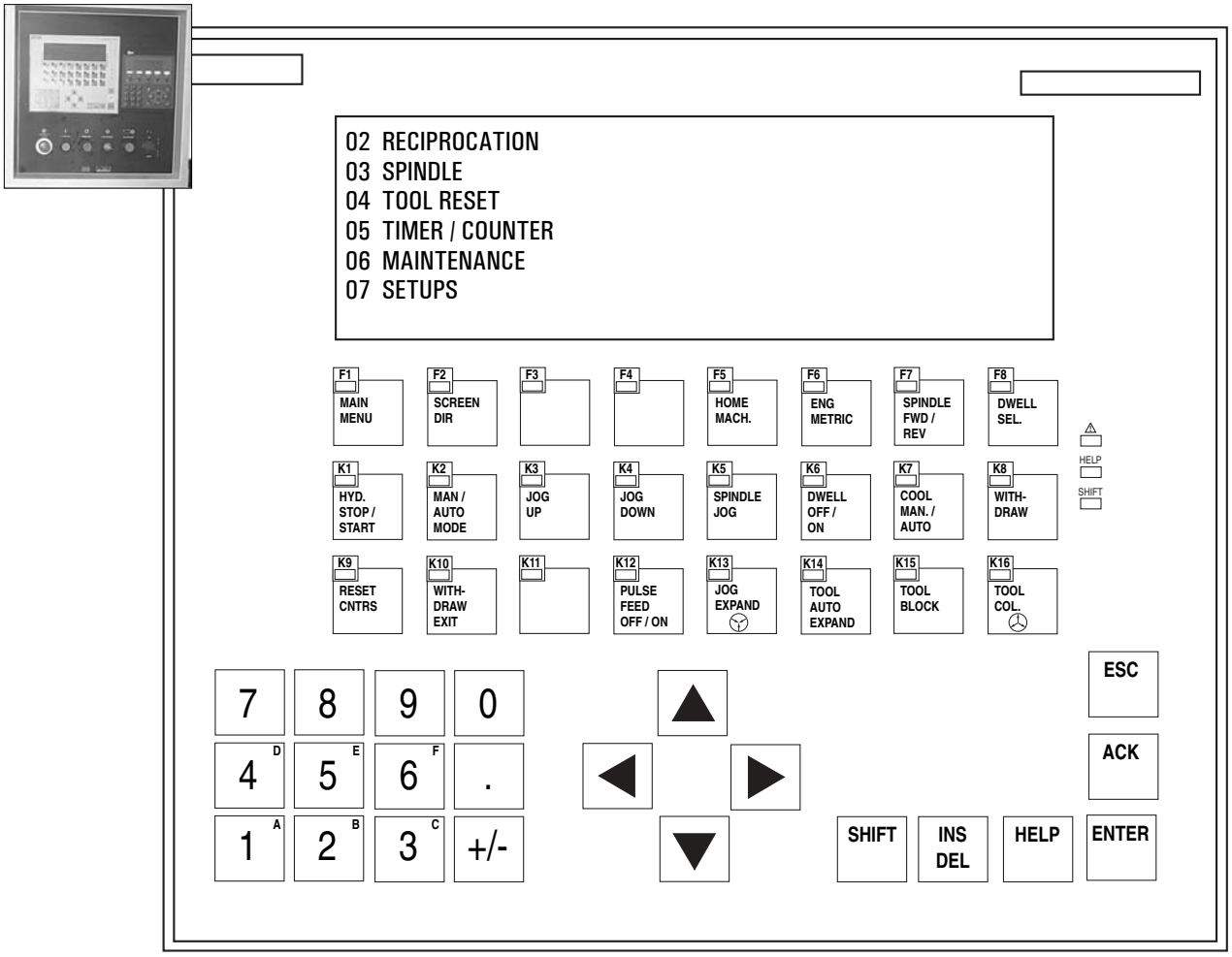
When F6 - Calibrate Load Meter is pressed, the following screen will appear:
Spindle will start rotating upon calibration start. Has all tooling been removed and brake engaged? If so, press F7 to begin calibration. If not, press F8 to return to system screen.

LINE 6: Operator entry to select ENGLISH or METRIC Units of Measurement.

LINE 7: Supervisor entry to reset PASSWORD Required Circuit. (Prevents various password protected parameters from being altered.)

SCREENS

SCREEN DIR SCREEN



LINE 1: Operator entry current Reciprocation Position of spindle carriage in relation to HOME POSITION.

LINE 2: Operator entry of desired BACK-GO-FORWARD Reciprocation Reversal Set Point.

LINE 3: Operator entry of desired FORWARD-GO-BACK Reciprocation Reversal Set Point.

LINE 4: Operator entry of desired Number of Reciprocation Strokes to be completed during HONING CYCLE.

LINE 5: Operator entry of desired Number of Reciprocation Strokes to be completed during RUNOUT CYCLE.

LINE 6: Operator entry of desired Reciprocation DWELL TIME. (Only active when K4 Dwell Off/On Keypad in turned ON.)

LINE 7: Operator entry to select desired Reciprocation DWELL POSITION.

<MORE> This screen has more text lines accessed by cursoring down.

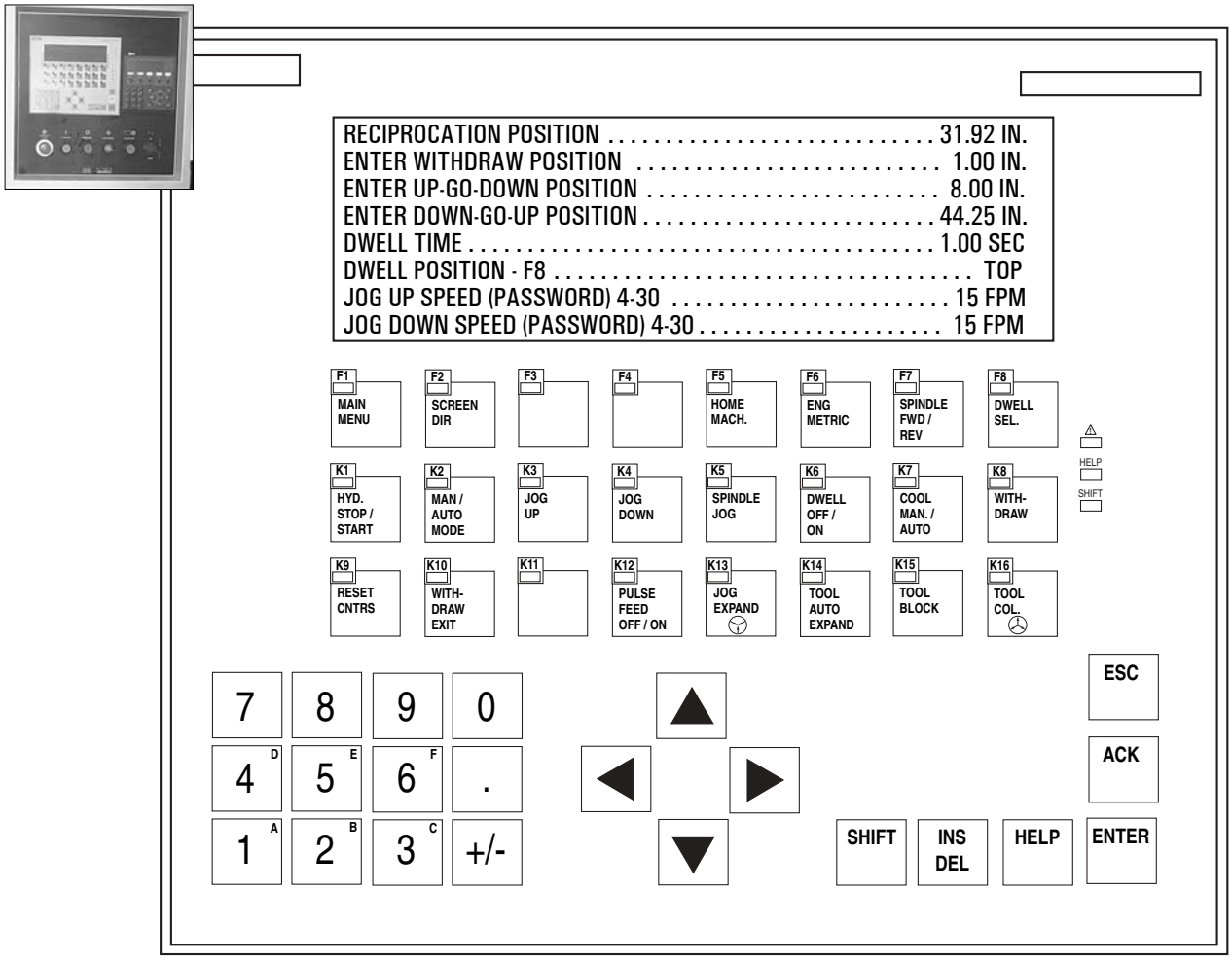
LINE 8: Operator entry to select desired AUTO SHORT STROKE TIME. (Active in Main Screen with F8-Button.)

LINE 9: Operator entry to select desired AUTO SHORT STROKE DISTANCE. (Active in Main Screen with F8-Button.)

LINE 10: Engages and disengages Spindle Brake. (F8 in this Screen.)

SCREENS

02 RECIPROCATION SCREEN



LINE 1: Displays to access the PRINTER PARAMETER SCREEN.

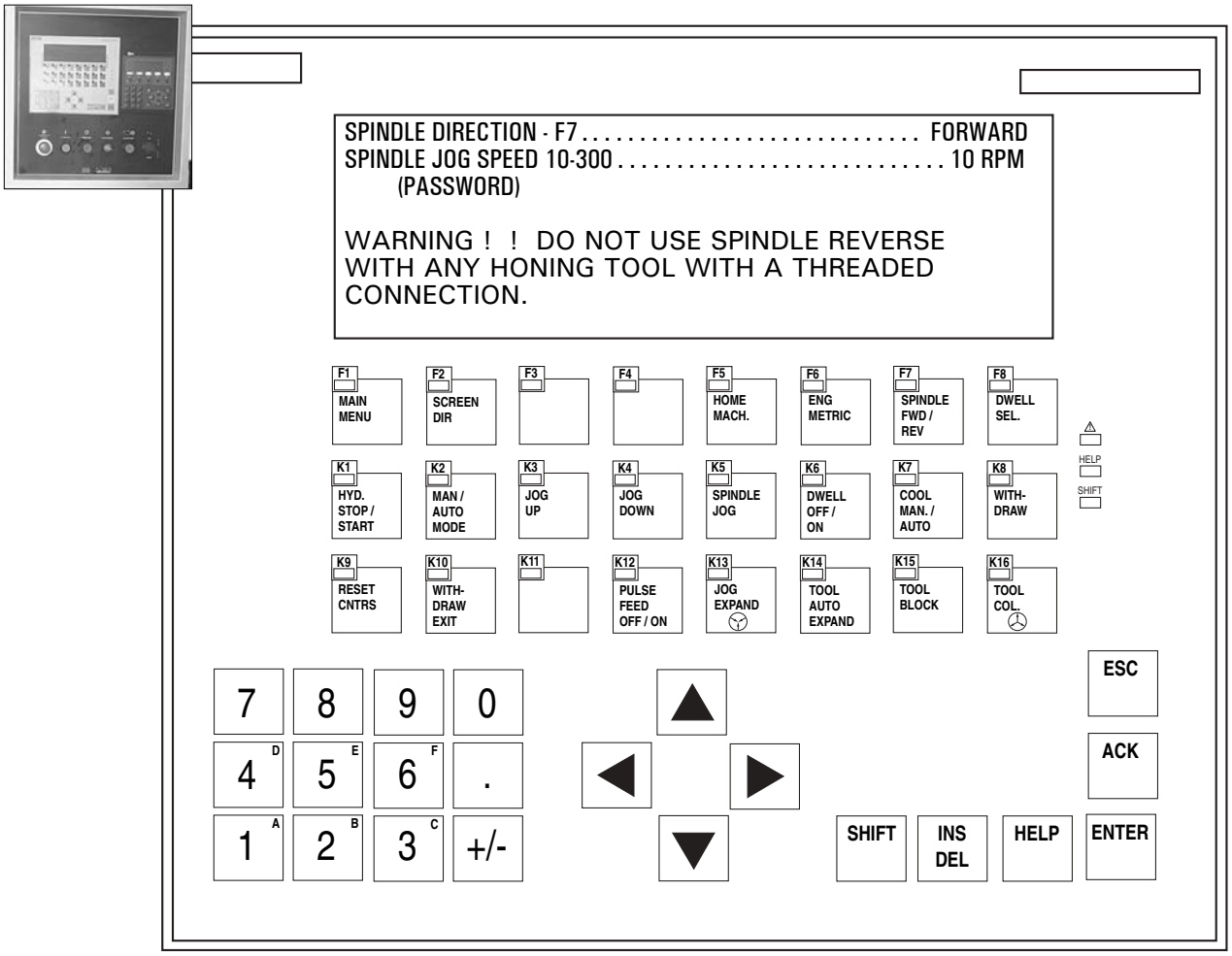
LINE 2: Displays to access the EDIT SETUP SCREEN.

LINE 3: Displays to access the TRANSFER SETUP SCREEN.

LINE 4: Displays to access the PRINT SETUP SCREEN.

SCREENS

03 SPINDLE SCREEN



LINE 1: Operator entry current Reciprocation Position of spindle carriage in relation to HOME POSITION.

LINE 2: Operator entry of desired BACK-GO-FORWARD Reciprocation Reversal Set Point.

LINE 3: Operator entry of desired FORWARD-GO-BACK Reciprocation Reversal Set Point.

LINE 4: Operator entry of desired Number of Reciprocation Strokes to be completed during HONING CYCLE.

LINE 5: Operator entry of desired Number of Reciprocation Strokes to be completed during RUNOUT CYCLE.

LINE 6: Operator entry of desired Reciprocation DWELL TIME. (Only active when K4 Dwell Off/On Keypad in turned ON.)

LINE 7: Operator entry to select desired Reciprocation DWELL POSITION.

<MORE> This screen has more text lines accessed by cursoring down.

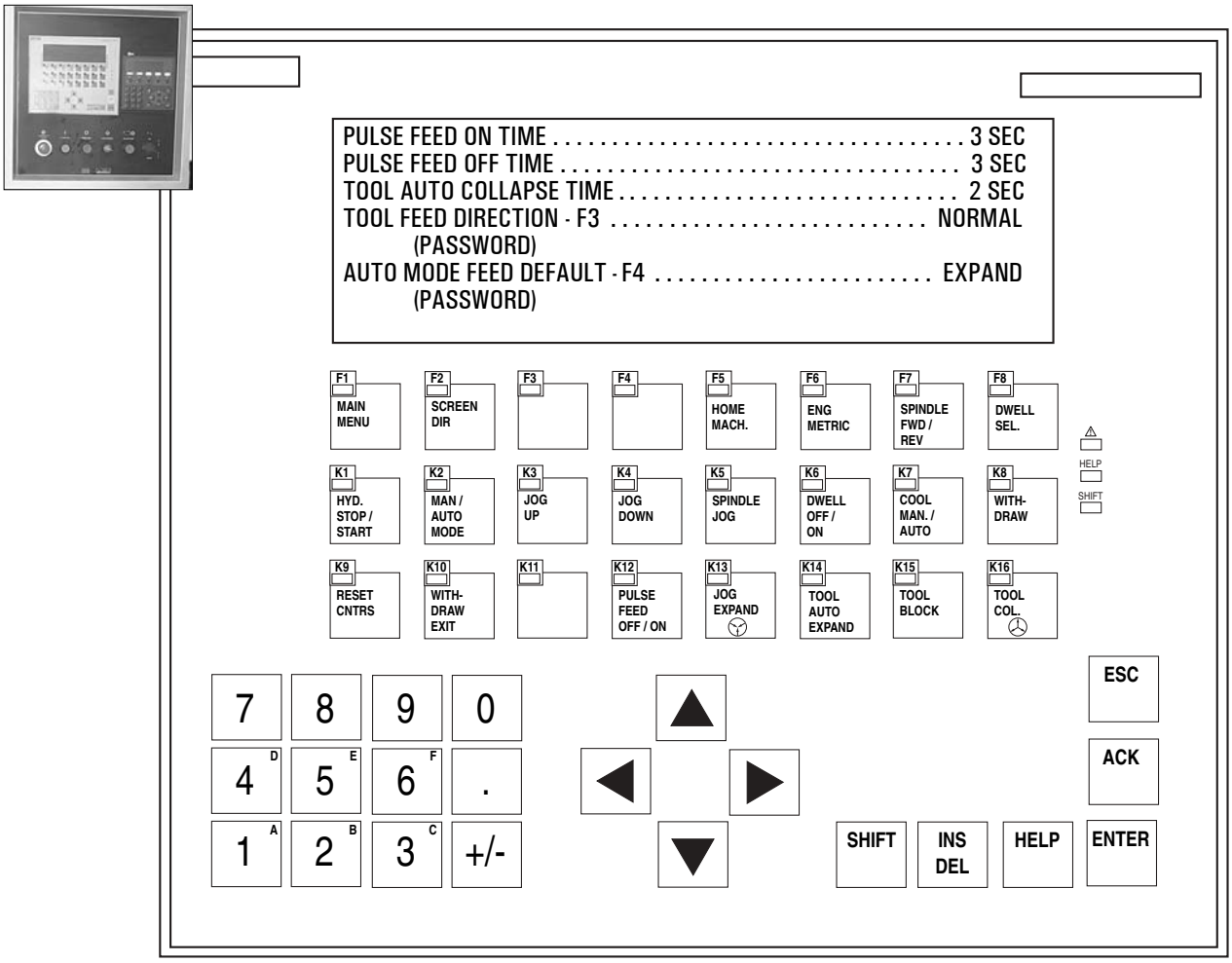
LINE 8: Operator entry to select desired AUTO SHORT STROKE TIME. (Active in Main Screen with F8-Button.)

LINE 9: Operator entry to select desired AUTO SHORT STROKE DISTANCE. (Active in Main Screen with F8-Button.)

LINE 10: Engages and disengages Spindle Brake. (F8 in this Screen.)

SCREENS

04 TOOL FEED SCREEN



LINE 1: Displays to access the PRINTER PARAMETER SCREEN.

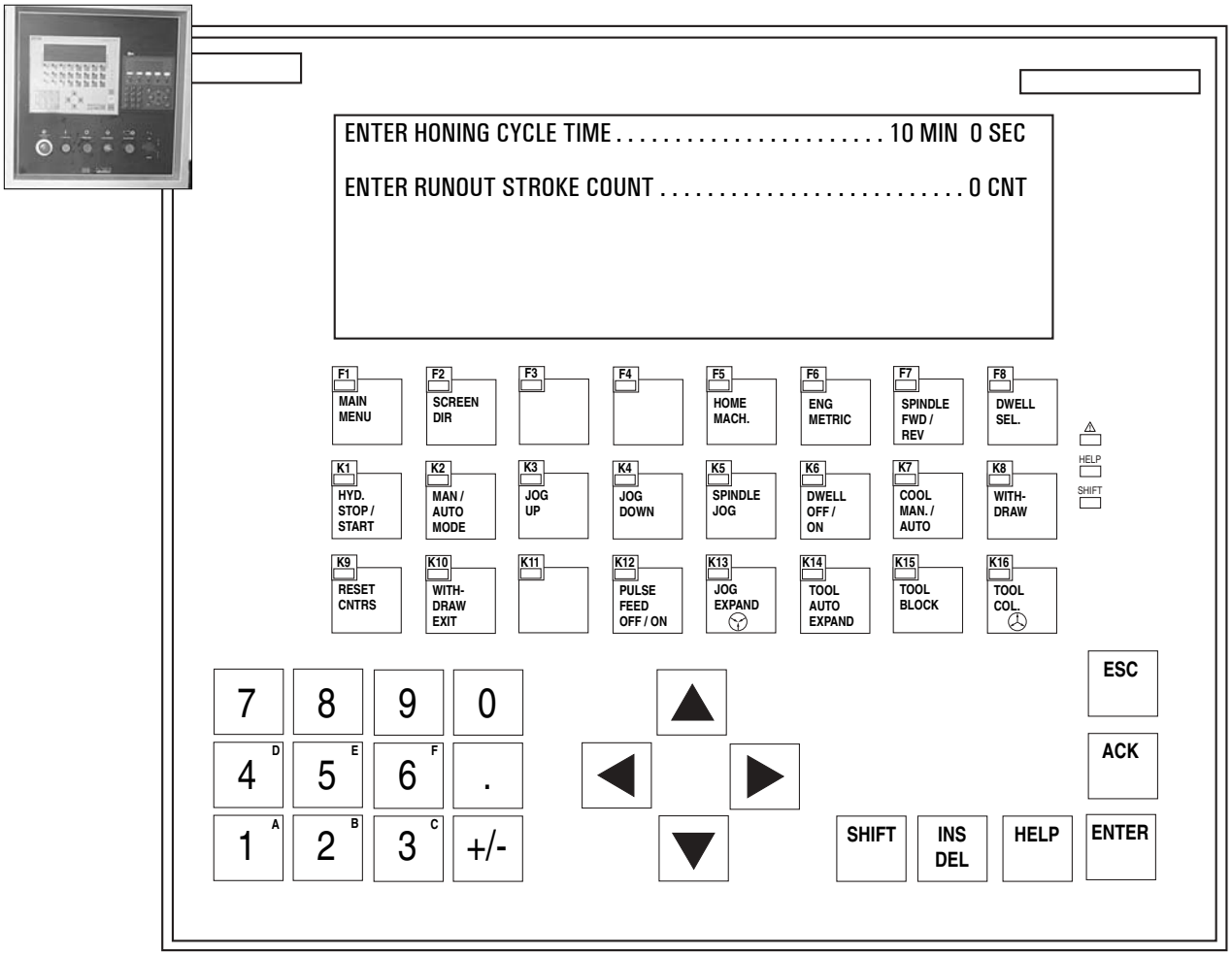
LINE 2: Displays to access the EDIT SETUP SCREEN.

LINE 3: Displays to access the TRANSFER SETUP SCREEN.

LINE 4: Displays to access the PRINT SETUP SCREEN.

SCREENS

05 TIMER / COUNTER SCREEN



LINE 1: Operator entry current Reciprocation Position of spindle carriage in relation to HOME POSITION.

LINE 2: Operator entry of desired BACK-GO-FORWARD Reciprocation Reversal Set Point.

LINE 3: Operator entry of desired FORWARD-GO-BACK Reciprocation Reversal Set Point.

LINE 4: Operator entry of desired Number of Reciprocation Strokes to be completed during HONING CYCLE.

LINE 5: Operator entry of desired Number of Reciprocation Strokes to be completed during RUNOUT CYCLE.

LINE 6: Operator entry of desired Reciprocation DWELL TIME. (Only active when K4 Dwell Off/On Keypad in turned ON.)

LINE 7: Operator entry to select desired Reciprocation DWELL POSITION.

<MORE> This screen has more text lines accessed by cursoring down.

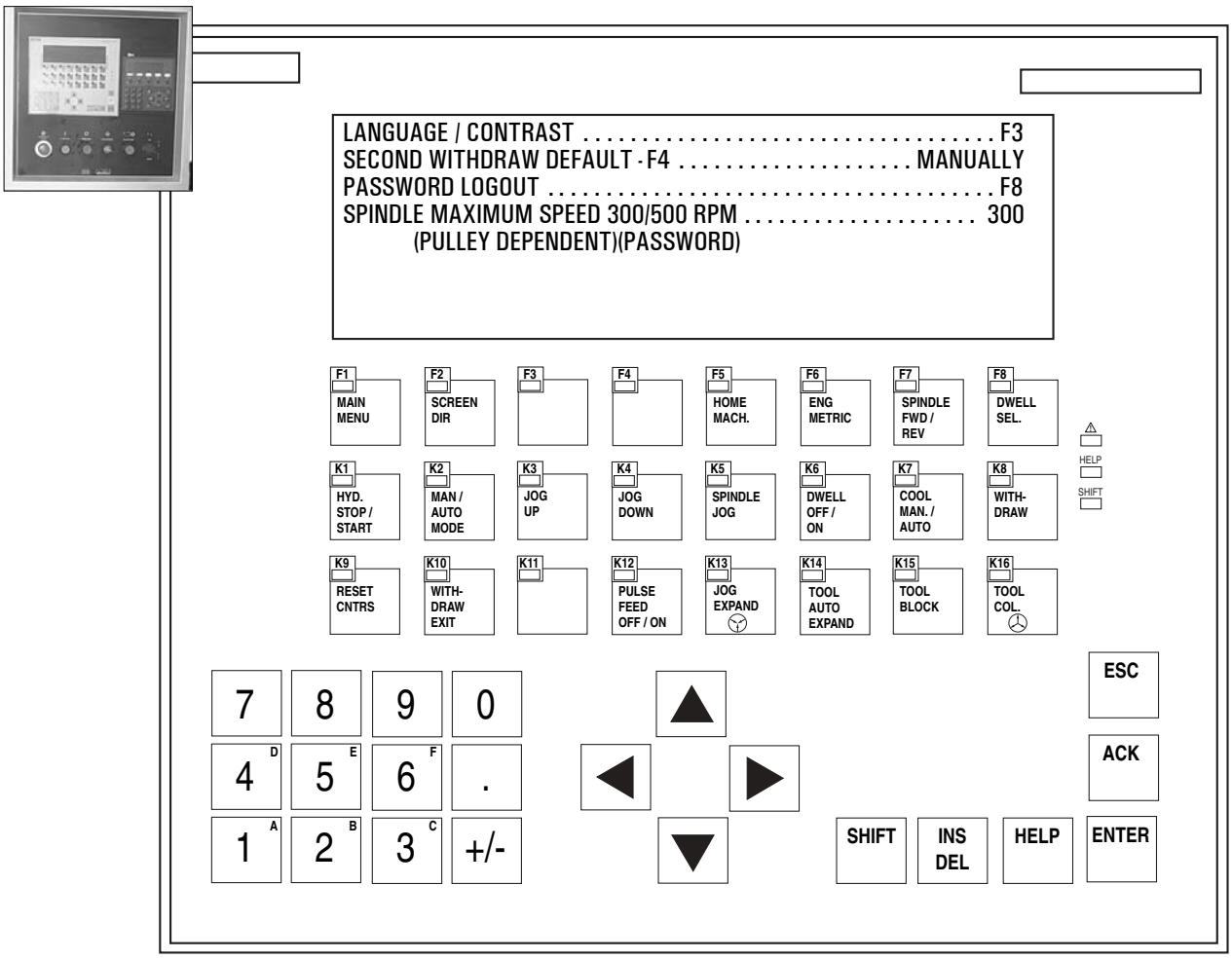
LINE 8: Operator entry to select desired AUTO SHORT STROKE TIME. (Active in Main Screen with F8-Button.)

LINE 9: Operator entry to select desired AUTO SHORT STROKE DISTANCE. (Active in Main Screen with F8-Button.)

LINE 10: Engages and disengages Spindle Brake. (F8 in this Screen.)

SCREENS

06 MAINTENANCE SCREEN



LINE 1: Displays to access the PRINTER PARAMETER SCREEN.

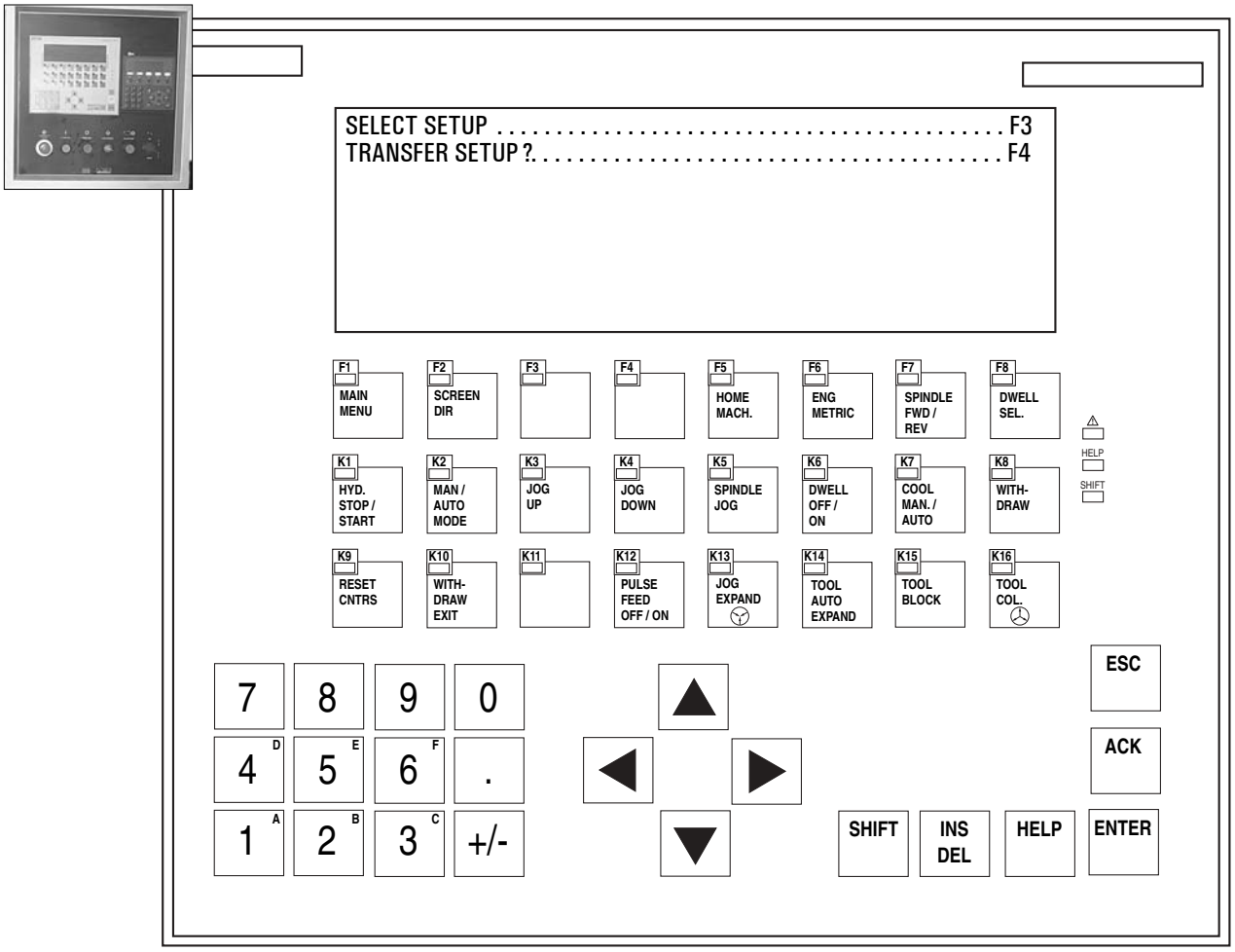
LINE 2: Displays to access the EDIT SETUP SCREEN.

LINE 3: Displays to access the TRANSFER SETUP SCREEN.

LINE 4: Displays to access the PRINT SETUP SCREEN.

SCREENS

07 SETUPS SCREEN



LINE 1: Operator entry current Reciprocation Position of spindle carriage in relation to HOME POSITION.

LINE 2: Operator entry of desired BACK-GO-FORWARD Reciprocation Reversal Set Point.

LINE 3: Operator entry of desired FORWARD-GO-BACK Reciprocation Reversal Set Point.

LINE 4: Operator entry of desired Number of Reciprocation Strokes to be completed during HONING CYCLE.

LINE 5: Operator entry of desired Number of Reciprocation Strokes to be completed during RUNOUT CYCLE.

LINE 6: Operator entry of desired Reciprocation DWELL TIME. (Only active when K4 Dwell Off/On Keypad in turned ON.)

LINE 7: Operator entry to select desired Reciprocation DWELL POSITION.

<MORE> This screen has more text lines accessed by cursoring down.

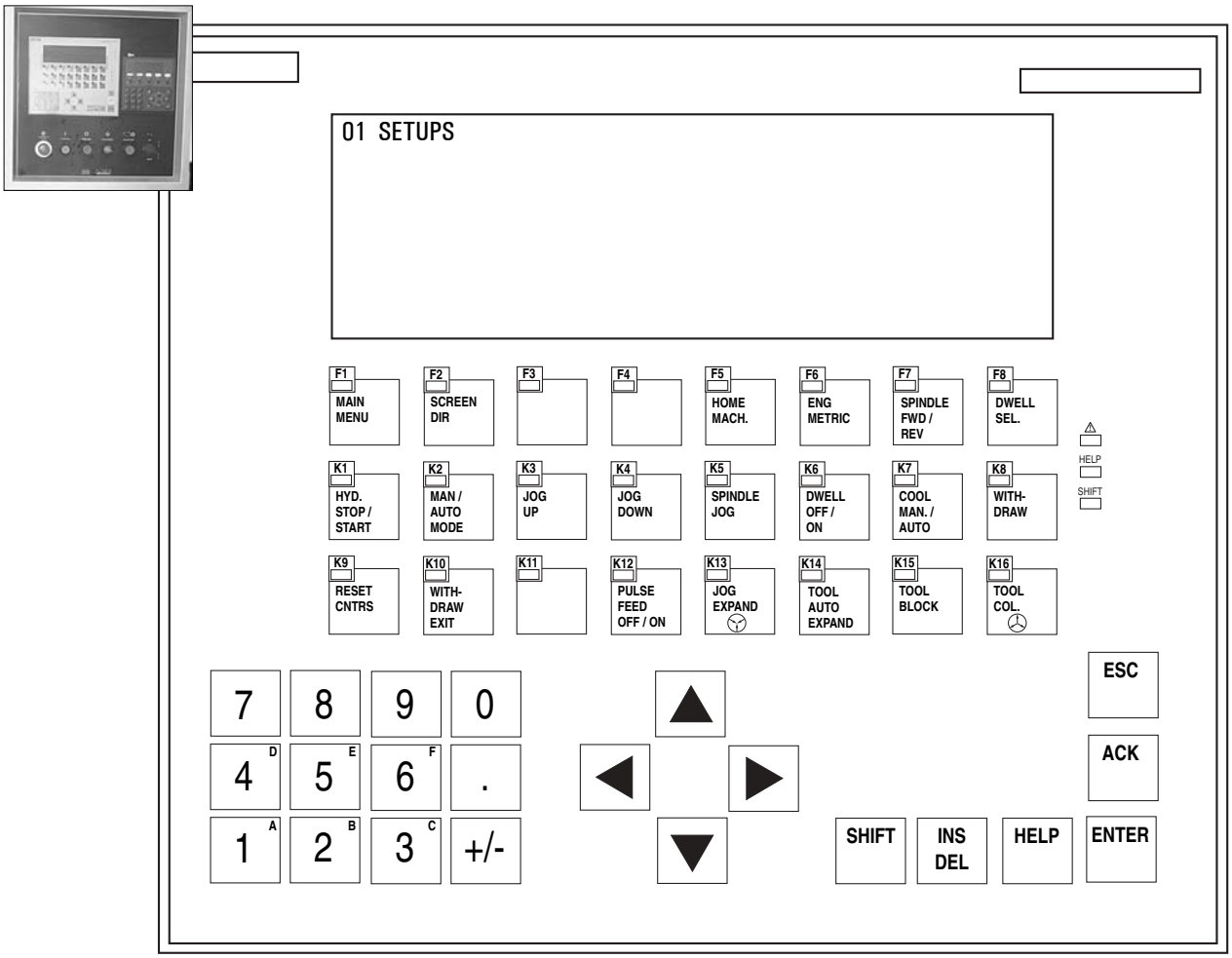
LINE 8: Operator entry to select desired AUTO SHORT STROKE TIME. (Active in Main Screen with F8-Button.)

LINE 9: Operator entry to select desired AUTO SHORT STROKE DISTANCE. (Active in Main Screen with F8-Button.)

LINE 10: Engages and disengages Spindle Brake. (F8 in this Screen.)

SCREENS

01 SETUPS (F3) SCREEN



LINE 1: Displays to access the PRINTER PARAMETER SCREEN.

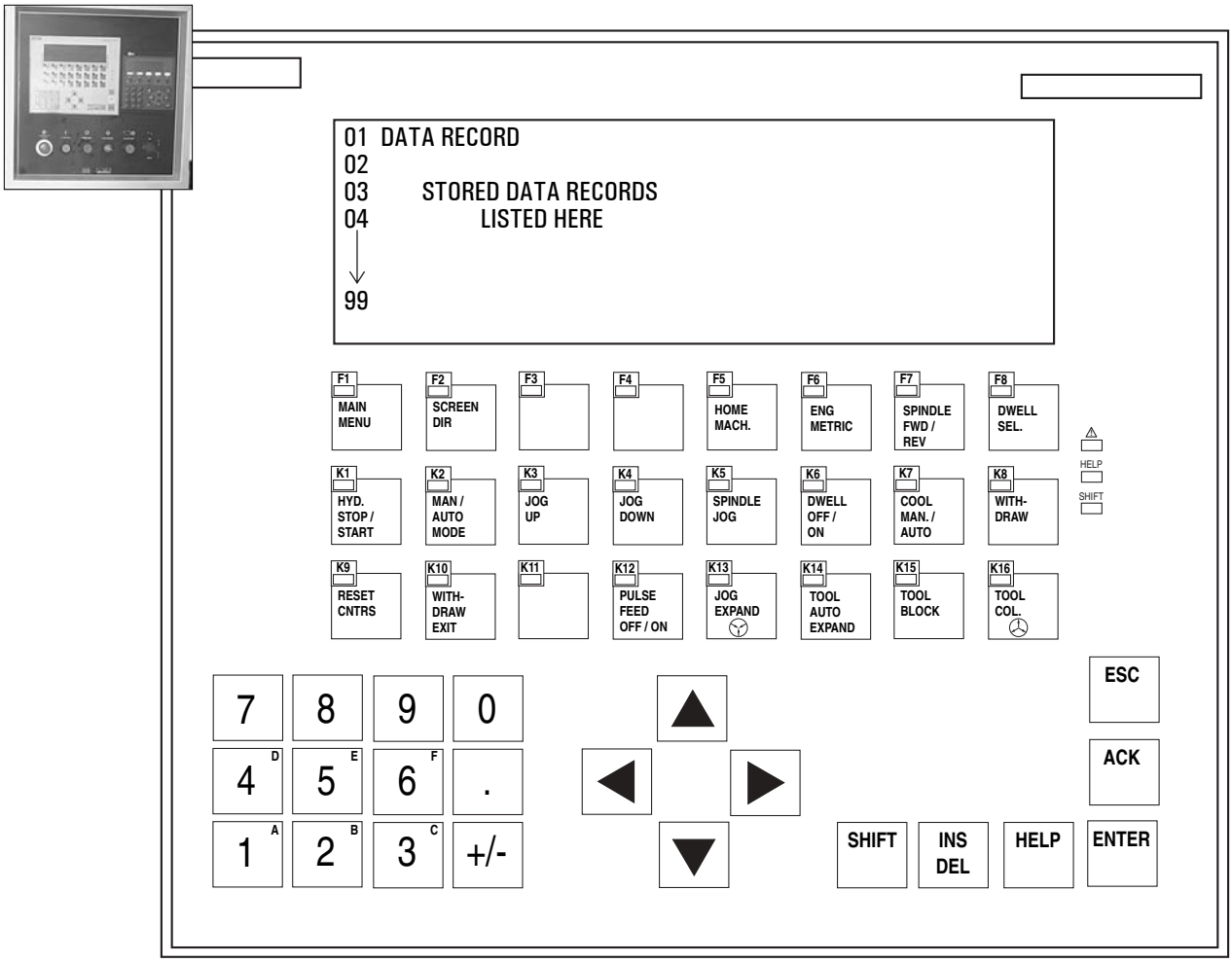
LINE 2: Displays to access the EDIT SETUP SCREEN.

LINE 3: Displays to access the TRANSFER SETUP SCREEN.

LINE 4: Displays to access the PRINT SETUP SCREEN.

SCREENS

(F3) 01 SETUPS SCREEN



LINE 1: Operator entry current Reciprocation Position of spindle carriage in relation to HOME POSITION.

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<MORE> This screen has more text lines accessed by cursoring down.

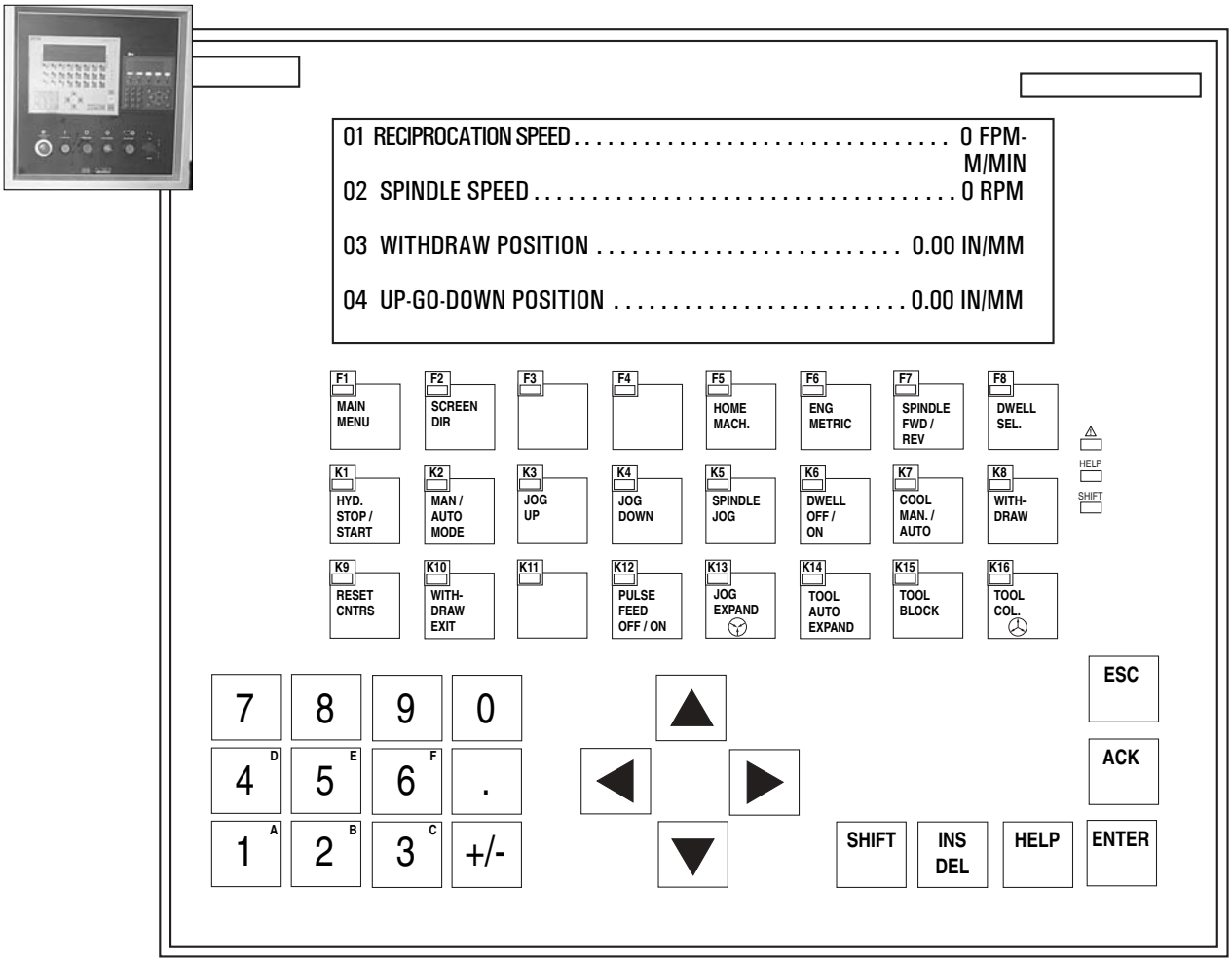
LINE 8: Operator entry to select desired AUTO SHORT STROKE TIME. (Active in Main Screen with F8-Button.)

LINE 9: Operator entry to select desired AUTO SHORT STROKE DISTANCE. (Active in Main Screen with F8-Button.)

LINE 10: Engages and disengages Spindle Brake. (F8 in this Screen.)

SCREENS

01 DATA RECORD SCREEN (1 of 3)



LINE 1: Displays to access the PRINTER PARAMETER SCREEN.

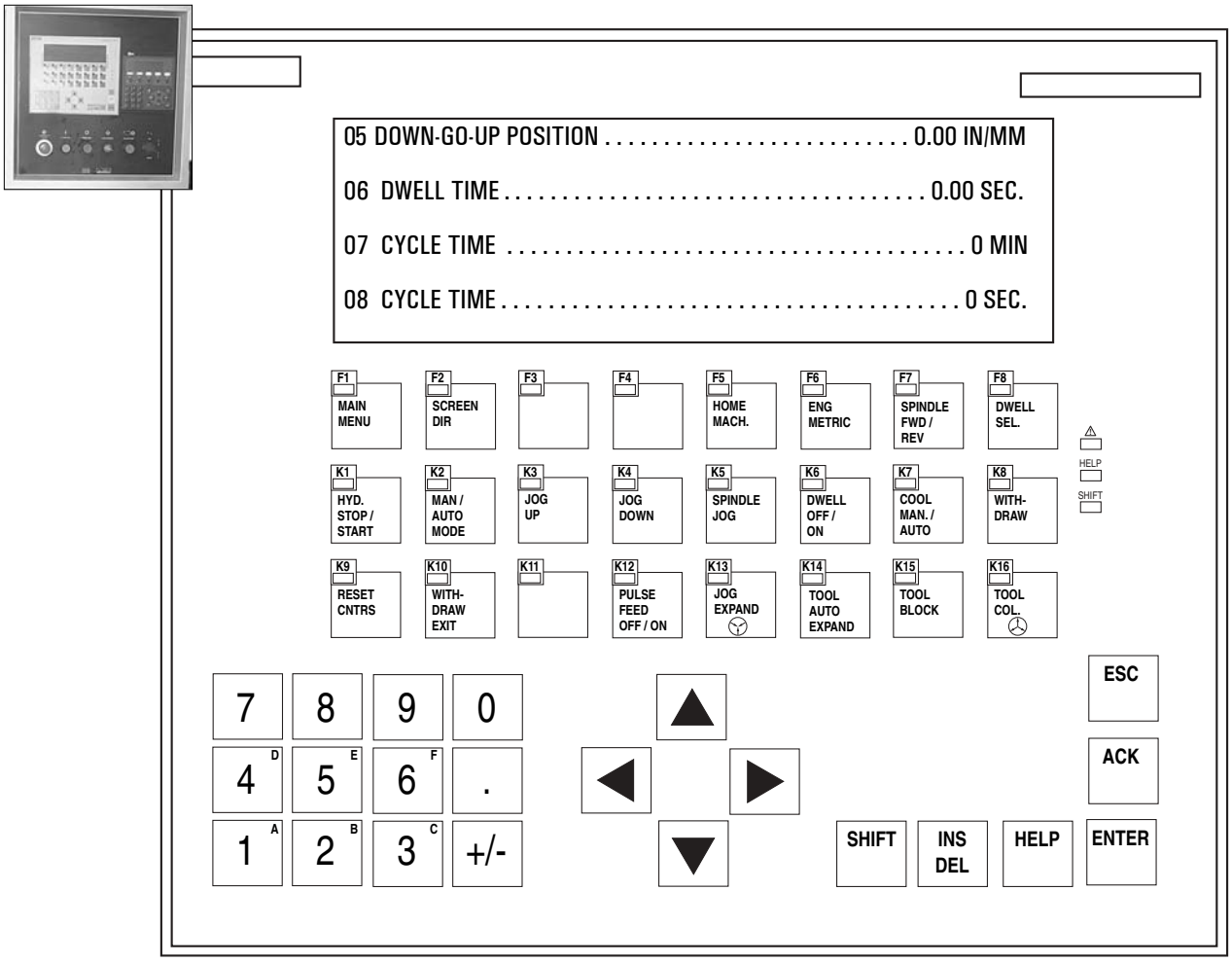
LINE 2: Displays to access the EDIT SETUP SCREEN.

LINE 3: Displays to access the TRANSFER SETUP SCREEN.

LINE 4: Displays to access the PRINT SETUP SCREEN.

SCREENS

01 DATA RECORD SCREEN (2 of 3)



LINE 1: Operator entry current Reciprocation Position of spindle carriage in relation to HOME POSITION.

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LINE 7: Operator entry to select desired Reciprocation DWELL POSITION.

<MORE> This screen has more text lines accessed by cursoring down.

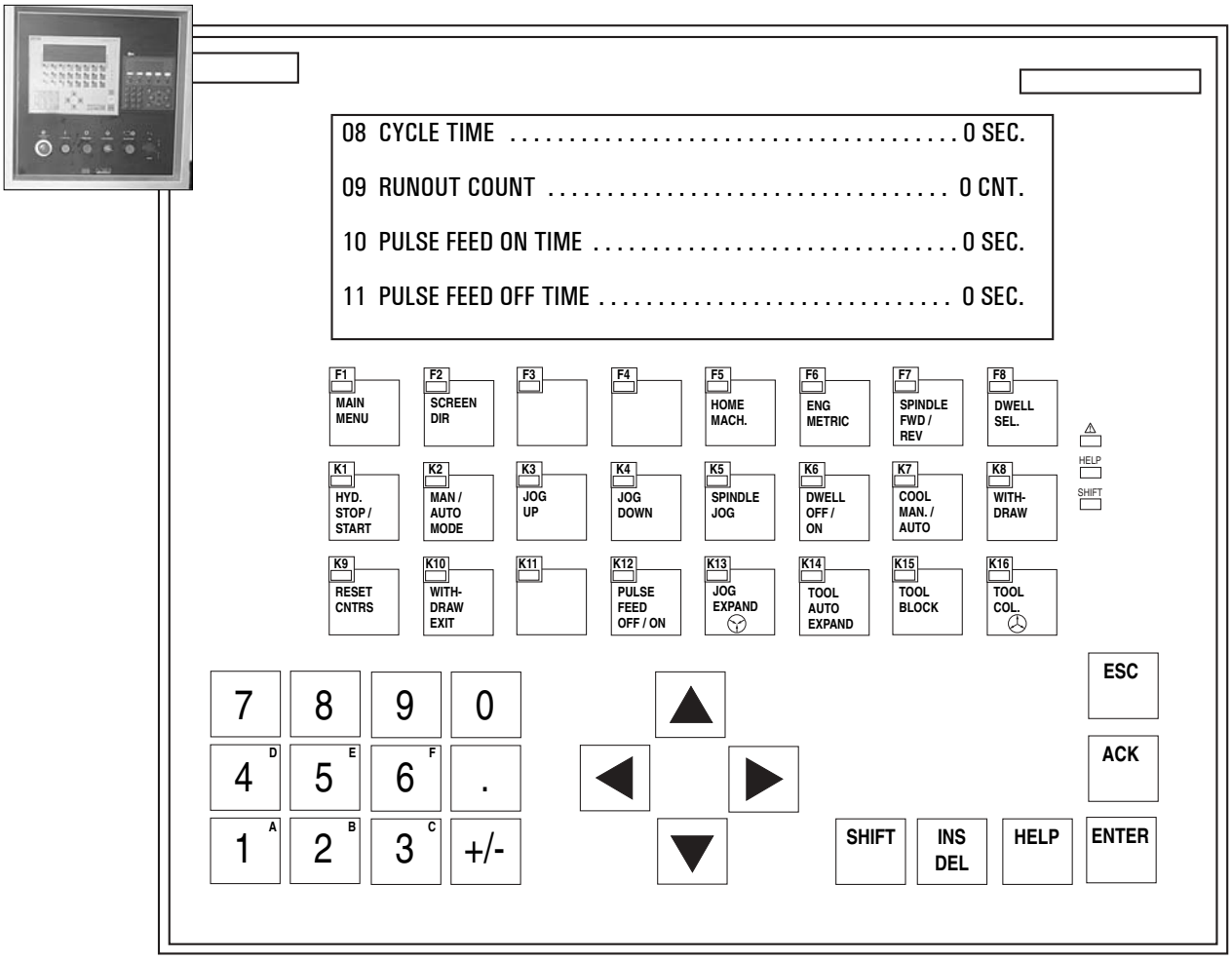
LINE 8: Operator entry to select desired AUTO SHORT STROKE TIME. (Active in Main Screen with F8-Button.)

LINE 9: Operator entry to select desired AUTO SHORT STROKE DISTANCE. (Active in Main Screen with F8-Button.)

LINE 10: Engages and disengages Spindle Brake. (F8 in this Screen.)

SCREENS

01 DATA RECORD SCREEN (3 of 3)



LINE 1: Displays to access the PRINTER PARAMETER SCREEN.

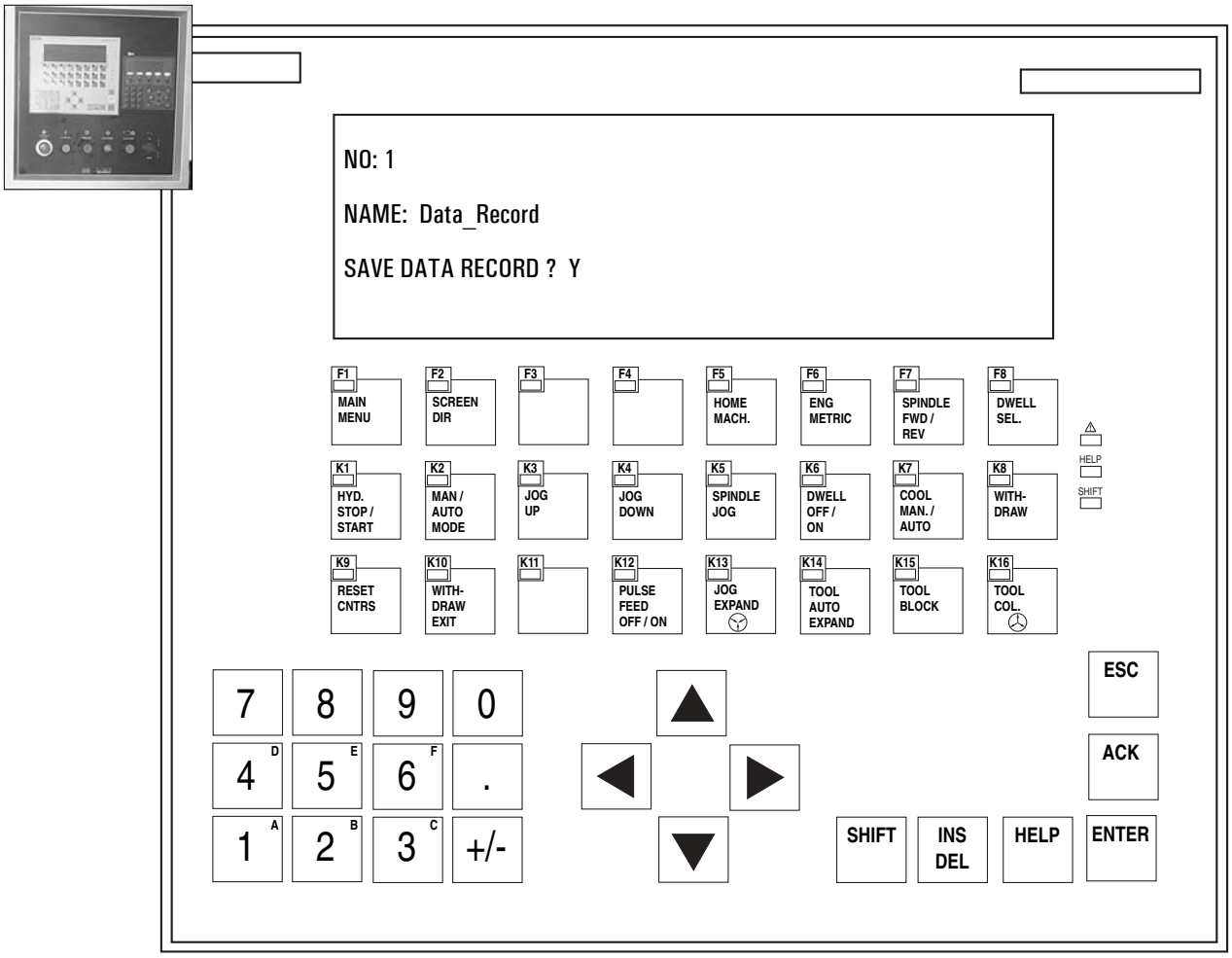
LINE 2: Displays to access the EDIT SETUP SCREEN.

LINE 3: Displays to access the TRANSFER SETUP SCREEN.

LINE 4: Displays to access the PRINT SETUP SCREEN.

SCREENS

01 DATA RECORD SCREEN



LINE 1: Operator entry current Reciprocation Position of spindle carriage in relation to HOME POSITION.

LINE 2: Operator entry of desired BACK-GO-FORWARD Reciprocation Reversal Set Point.

LINE 3: Operator entry of desired FORWARD-GO-BACK Reciprocation Reversal Set Point.

LINE 4: Operator entry of desired Number of Reciprocation Strokes to be completed during HONING CYCLE.

LINE 5: Operator entry of desired Number of Reciprocation Strokes to be completed during RUNOUT CYCLE.

LINE 6: Operator entry of desired Reciprocation DWELL TIME. (Only active when K4 Dwell Off/On Keypad in turned ON.)

LINE 7: Operator entry to select desired Reciprocation DWELL POSITION.

<MORE> This screen has more text lines accessed by cursoring down.

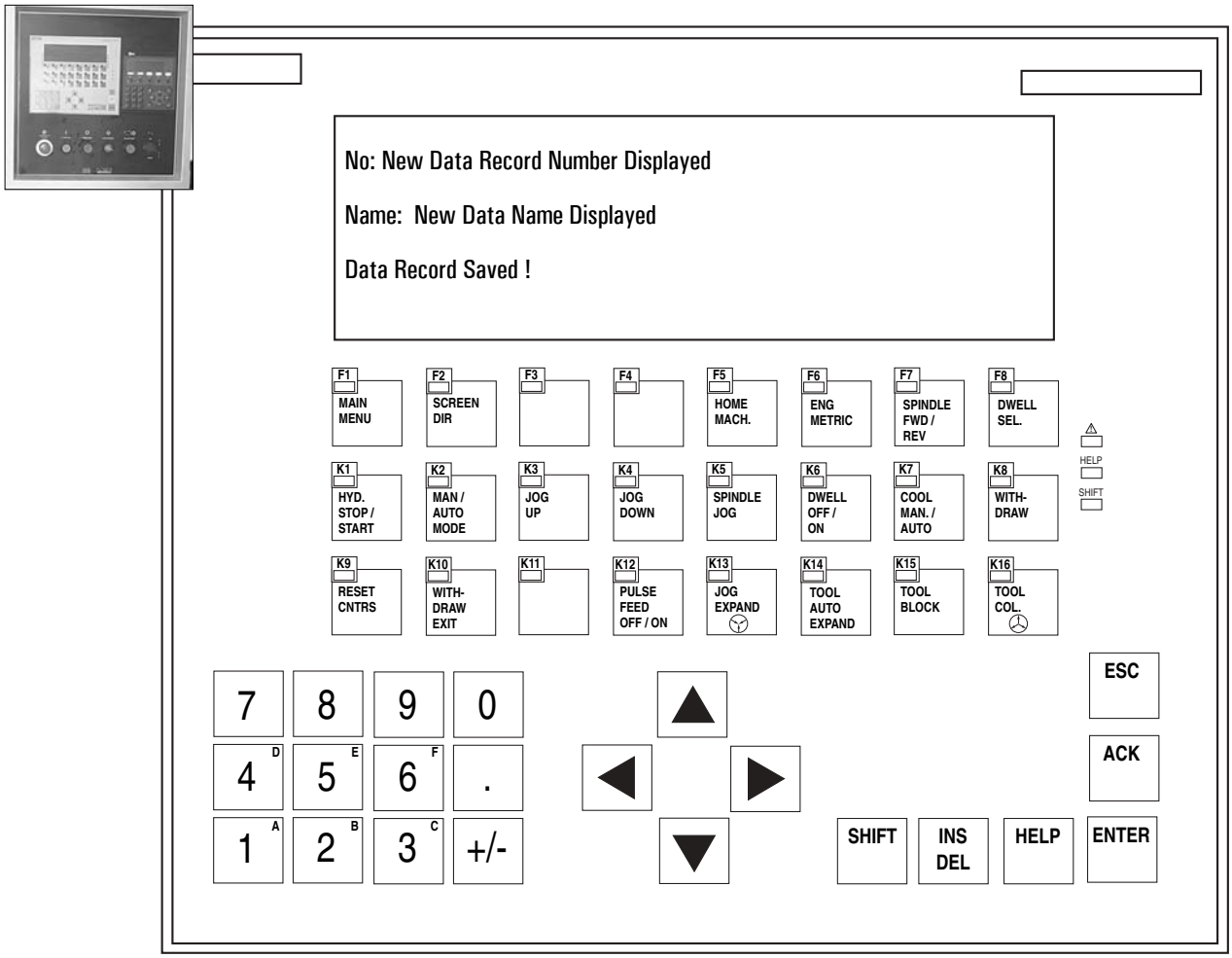
LINE 8: Operator entry to select desired AUTO SHORT STROKE TIME. (Active in Main Screen with F8-Button.)

LINE 9: Operator entry to select desired AUTO SHORT STROKE DISTANCE. (Active in Main Screen with F8-Button.)

LINE 10: Engages and disengages Spindle Brake. (F8 in this Screen.)

SCREENS

01 DATA RECORD SCREEN



LINE 1: Displays to access the PRINTER PARAMETER SCREEN.

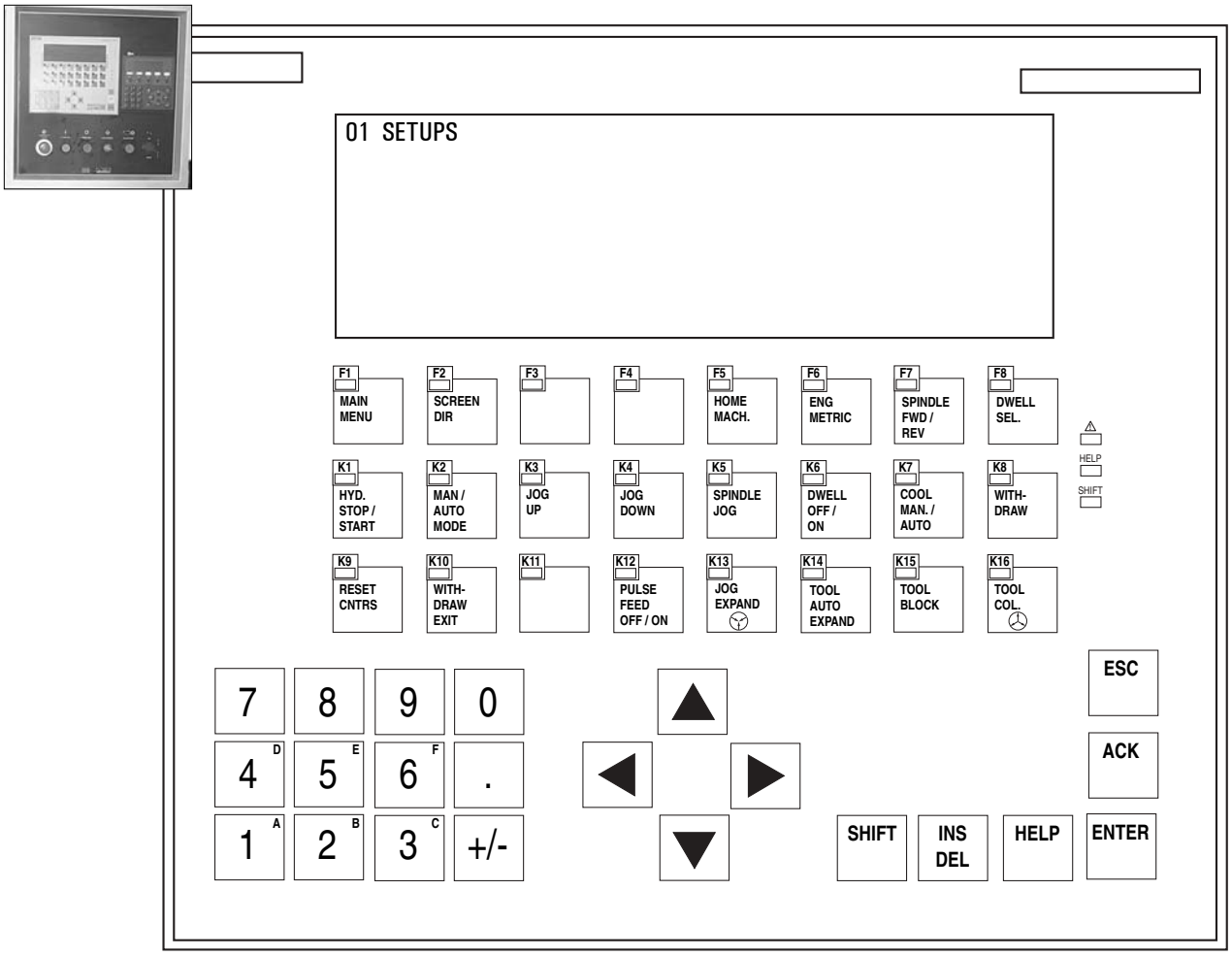
LINE 2: Displays to access the EDIT SETUP SCREEN.

LINE 3: Displays to access the TRANSFER SETUP SCREEN.

LINE 4: Displays to access the PRINT SETUP SCREEN.

SCREENS

07 SETUPS (F4) SCREEN



LINE 1: Operator entry current Reciprocation Position of spindle carriage in relation to HOME POSITION.

LINE 2: Operator entry of desired BACK-GO-FORWARD Reciprocation Reversal Set Point.

LINE 3: Operator entry of desired FORWARD-GO-BACK Reciprocation Reversal Set Point.

LINE 4: Operator entry of desired Number of Reciprocation Strokes to be completed during HONING CYCLE.

LINE 5: Operator entry of desired Number of Reciprocation Strokes to be completed during RUNOUT CYCLE.

LINE 6: Operator entry of desired Reciprocation DWELL TIME. (Only active when K4 Dwell Off/On Keypad in turned ON.)

LINE 7: Operator entry to select desired Reciprocation DWELL POSITION.

<MORE> This screen has more text lines accessed by cursoring down.

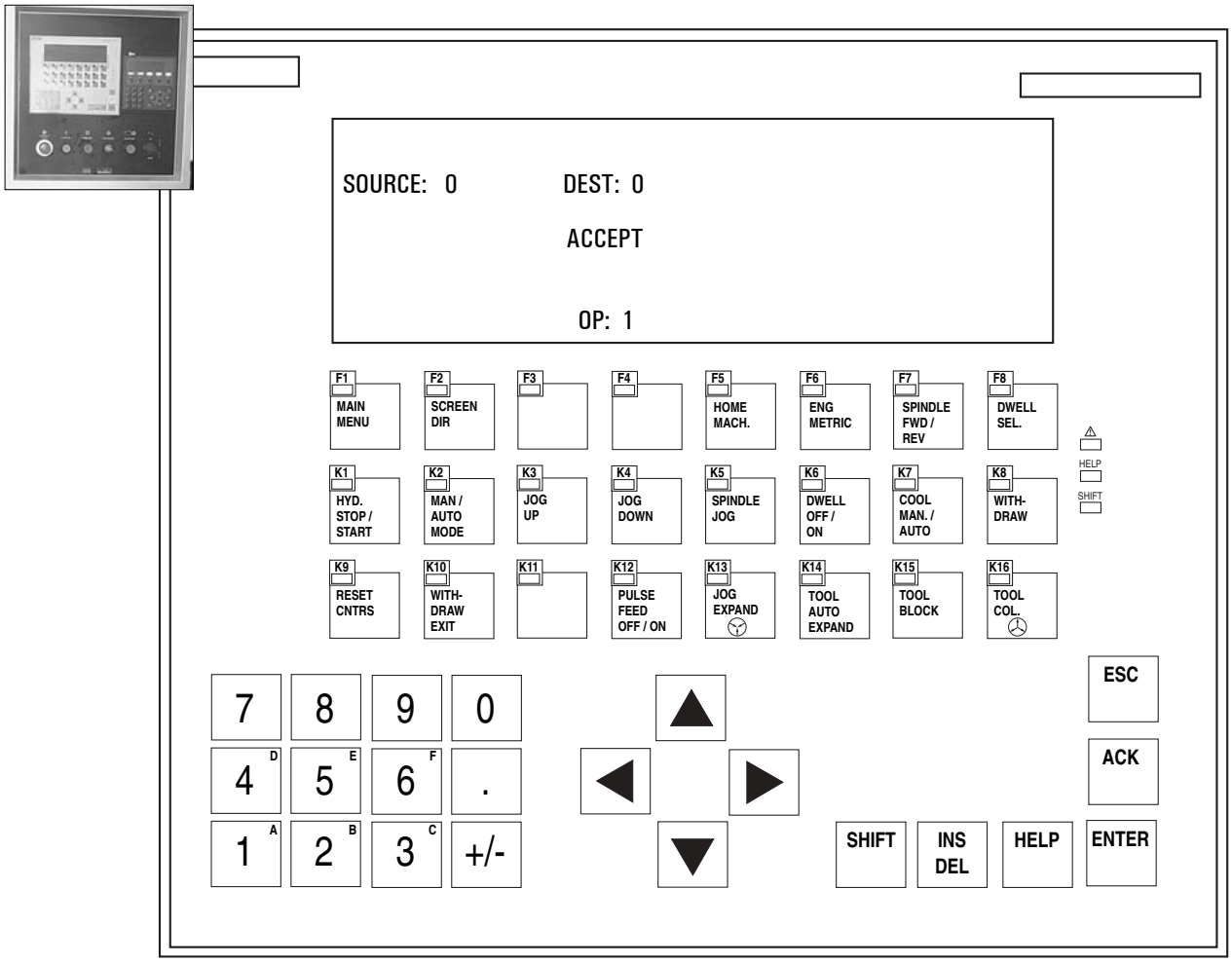
LINE 8: Operator entry to select desired AUTO SHORT STROKE TIME. (Active in Main Screen with F8-Button.)

LINE 9: Operator entry to select desired AUTO SHORT STROKE DISTANCE. (Active in Main Screen with F8-Button.)

LINE 10: Engages and disengages Spindle Brake. (F8 in this Screen.)

SCREENS

(F4) 01 SETUPS SCREEN



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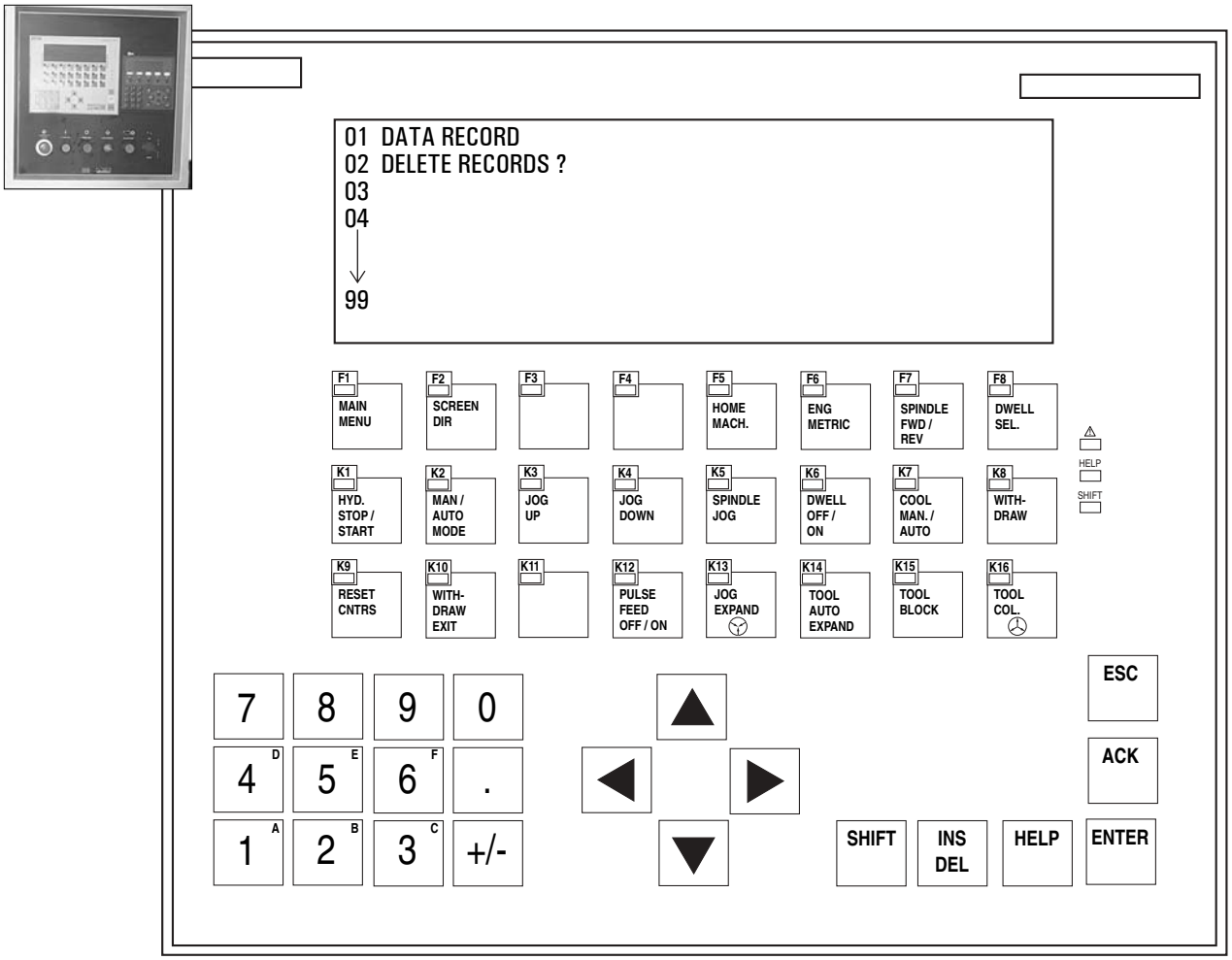
LINE 4: Displays to access the PRINT SETUP SCREEN.

SCREENS

(F3) 01 SETUPS SCREEN



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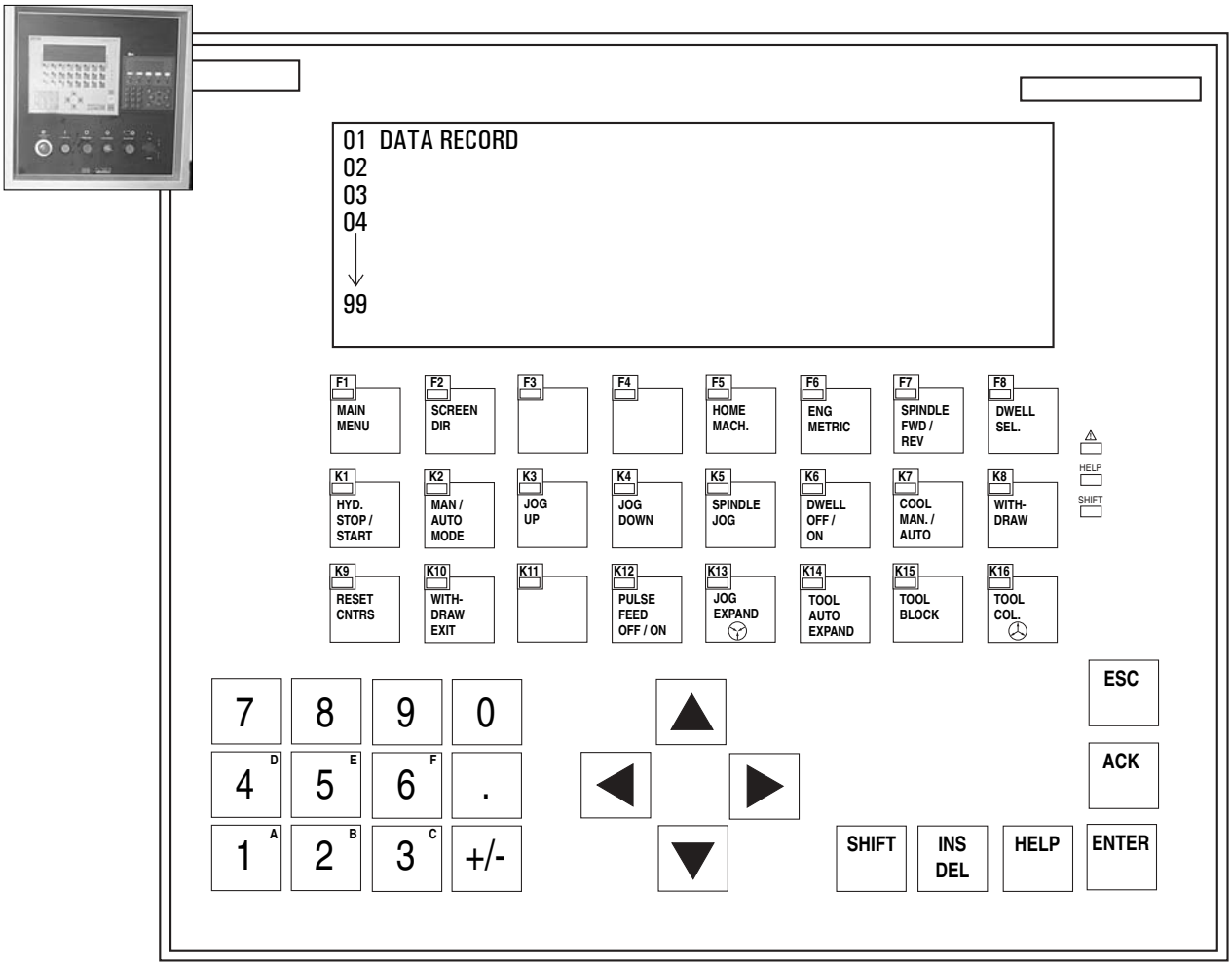
SCREENS

(F3) 01 SETUPS SCREEN



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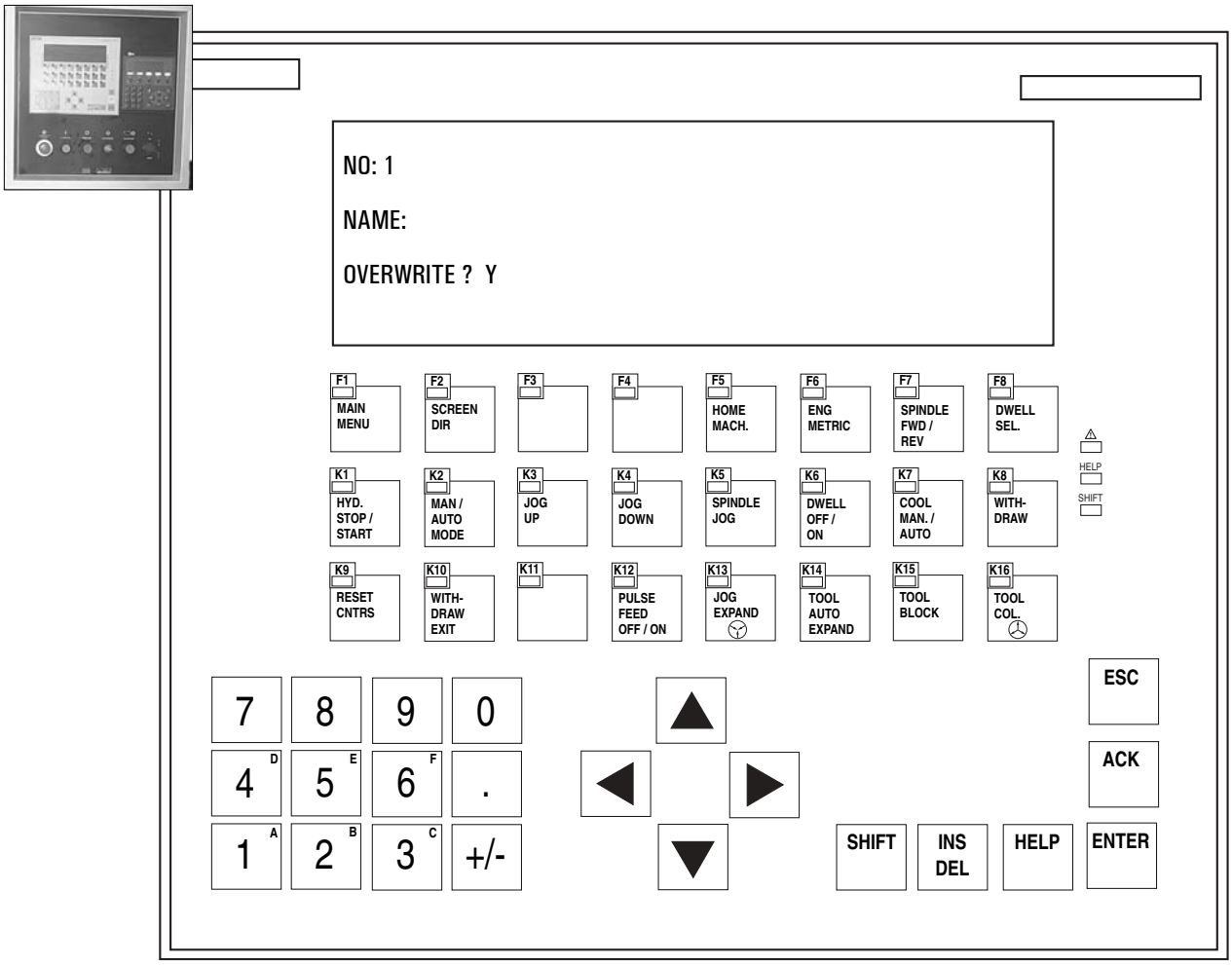
SCREENS

(F3) 01 SETUPS SCREEN



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NOTES

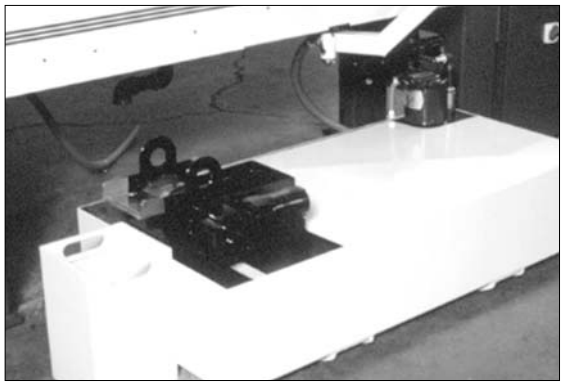
SPEED CONVERSION CHART

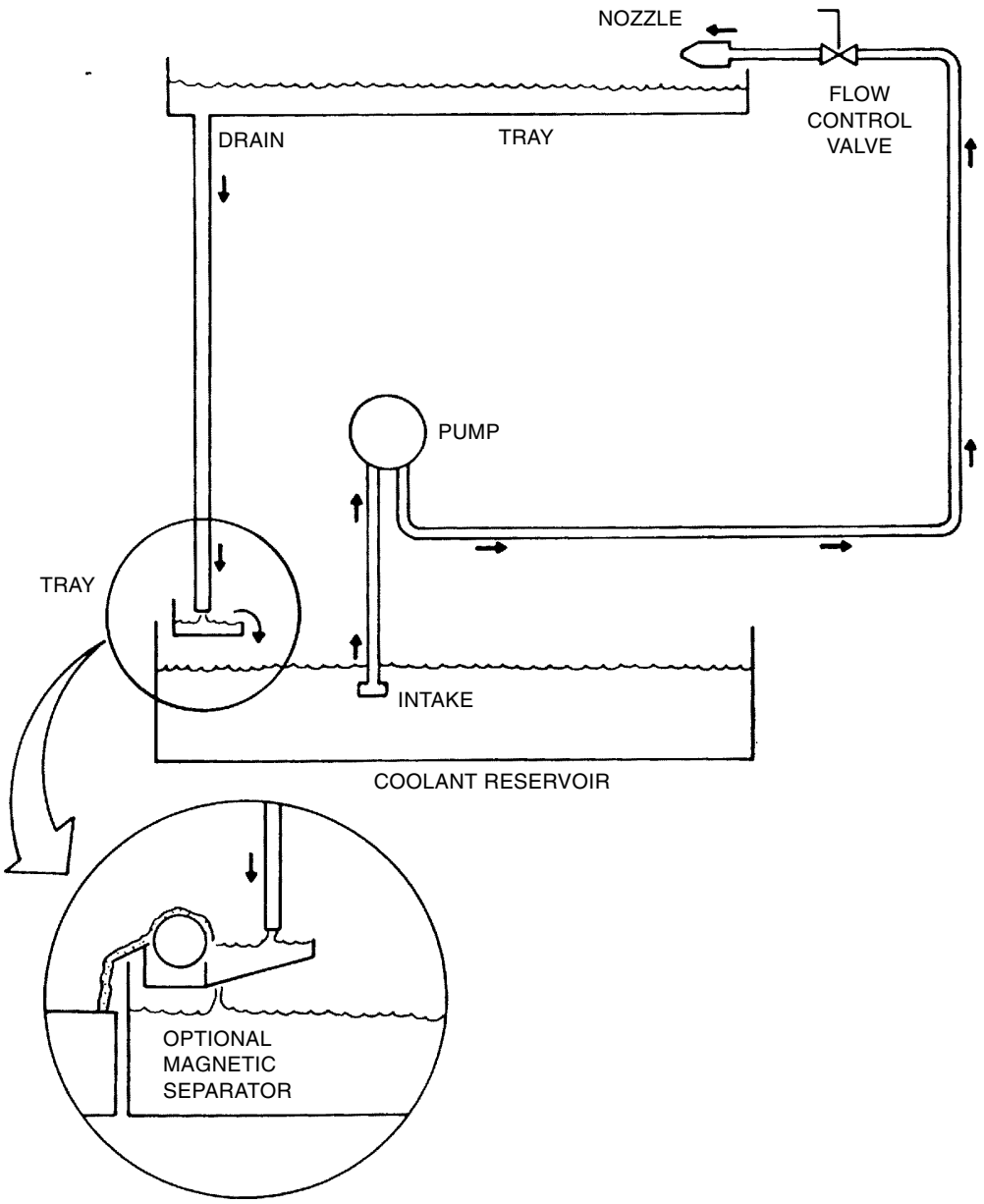
PERIPHERAL SFM TO RPM

Bore Dia.	Surface Speed in FPM																					Bore Dia.
	70	75	80	85	90	95	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	
0.250	1067	1144	1220	1296	1372	1449	1525	1677	1830	1982	2135	2286	2440	2593	2745	2898	3050	3203	3355	3508	3660	0.250
0.375	725	777	828	882	933	985	1035	1140	1245	1347	1452	1555	1658	1763	1868	1970	2075	2180	2280	2385	2490	0.375
0.500	536	574	612	650	689	727	765	842	918	995	1070	1148	1224	1301	1377	1454	1530	1607	1683	1760	1836	0.500
0.625	428	459	490	520	551	581	612	673	734	796	857	918	979	1040	1102	1163	1224	1285	1346	1408	1469	0.625
0.750	357	382	408	433	459	485	510	561	62	663	714	765	816	867	918	969	1020	1071	1122	1173	1224	0.750
0.875	306	328	350	371	393	415	437	481	524	568	612	656	699	743	787	830	874	918	961	1005	1049	0.875
1.000	267	286	305	325	344	363	382	420	458	497	535	573	612	649	687	726	764	802	840	878	918	1.000
1.125	238	255	272	289	306	323	340	374	408	442	476	610		578	612	646	680	714	748	782	816	1.125
1.250	214	230	249	260	275	291	306	337	367	398	428	459	490	520	551	581	612	643	673	704	734	1.250
1.375	195	209	222	236	250	264	278	306	334	361	389	417	445	473	500	528	556	584	612	639	667	1.375
1.500	178	191	204	217	230	242	255	281	306	332	358	383	408	435	460	486	512	538	562	587	614	1.500
1.625	165	176	188	200	212	223	235	259	282	306	329	353	376	400	423	447	470	494	517	541	564	1.625
1.750	153	164	174	185	196	207	218	240	262	283	305	327	349	371	392	414	436	458	480	501	523	1.750
1.875	143	163	163	173	184	194	204	224	245	265	287	306	326	347	367	388	408	428	449	469	490	1.875
2.000	133	143	153	162	172	182	191	210	229	248	268	287	306	325	344	363	382	402	420	438	458	2.000
2.250	119	128	136	145	153	162	170	187	204	221	238	255	272	289	306	323	340	357	374	391	408	2.250
2.500	107	115	122	130	138	145	153	168	183	199	214	230	245	260	275	290	306	321	337	352	367	2.500
2.750	97	104	111	118	125	132	139	153	167	181	195	209	222	236	250	264	278	292	306	320	334	2.750
3.000	89	96	102	108	115	121	128	140	153	166	179	192	204	217	230	243	255	268	281	293	307	3.000
3.250	82	88	94	100	106	112	118	129	141	152	165	176	188	200	212	223	235	247	259	270	282	3.250
3.500	77	82	88	93	99	104	110	120	131	142	153	164	175	186	197	208	219	230	241	252	263	3.500
3.750	71	77	82	88	92	97	102	112	122	133	143	153	163	173	184	194	204	214	224	235	245	3.750
4.000	67	72	77	81	86	91	96	105	115	125	134	144	153	163	172	182	191	201	210	220	230	4.000
4.250	63	68	72	77	81	86	90	99	108	117	126	135	144	153	162	171	180	189	198	207	216	4.250
4.500	60	64	68	72	77	81	85	94	102	111	119	128	136	145	153	162	170	179	187	196	204	4.500
4.750	56	60	64	68	72	76	81	89	97	105	113	121	129	137	145	153	161	169	177	185	193	4.750
5.000	54	57	61	65	69	73	76	84	92	99	107	114	122	130	137	145	152	160	168	175	183	5.000
5.500	49	52	56	59	63	66	70	76	83	90	97	104	111	118	125	132	139	146	153	160	167	5.500
6.000	45	48	51	54	57	61	64	70	76	83	89	96	102	108	115	121	127	134	140	147	153	6.000
6.500	41	43	47	50	53	56	59	64	70	76	82	87	94	100	106	111	117	123	129	135	141	6.500
7.000	38	41	44	46	49	52	55	60	65	71	76	82	87	93	98	103	109	114	120	125	131	7.000
7.500	36	38	41	43	46	48	51	56	61	66	71	77	82	87	92	97	102	107	112	117	122	7.500
8.000	33	36	38	41	43	45	48	53	57	62	67	72	76	81	86	91	96	100	105	110	115	8.000
8.500	32	34	36	38	41	43	45	50	54	59	63	68	72	77	81	86	90	95	99	104	108	8.500
9.000	30	32	34	36	38	40	43	47	51	55	60	64	68	72	77	81	85	89	94	98	102	9.000
9.500	28	30	32	34	36	38	40	44	48	52	56	60	64	69	73	77	81	85	89	93	97	9.500
10.000	27	29	31	32	34	36	38	42	46	50	53	57	61	65	69	73	76	80	84	88	92	10.000
11.000	24	26	28	29	31	33	35	38	42	45	49	52	56	59	62	66	69	73	76	79	83	11.000
12.000	22	24	26	27	29	30	32	35	38	41	45	48	51	54	57	61	64	67	70	73	77	12.000
13.000	21	22	24	25	26	28	29	32	35	38	41	44	47	50	53	56	59	62	65	68	71	13.000
14.000	19	20	22	23	25	26	27	30	33	35	38	41	44	46	49	52	55	57	60	63	66	14.000
15.000	18	19	20	22	23	24	26	28	31	33	36	38	41	43	46	48	51	54	56	59	61	15.000
16.000	17	18	19	20	22	23	24	26	29	31	33	36	38	41	43	45	48	50	53	55	57	16.000
17.000	16	17	18	19	20	21	23	25	27	29	32	34	36	38	41	43	45	47	50	52	54	17.000
18.000	15	16	17	18	19	20	21	23	25	28	30	32	34	36	38	40	42	45	47	49	51	18.000
19.000	14	15	16	17	18	19	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	19.000
20.000	13	15	15	16	17	18	19	21	23	25	27	29	31	32	34	36	38	40	42	44	46	20.000

COOLANT FLOW DIAGRAM

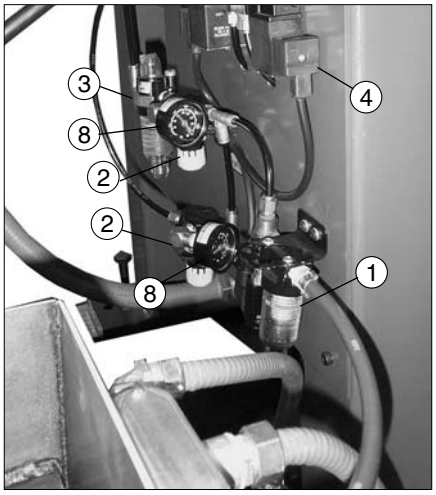
CENTRIFUGAL PUMP

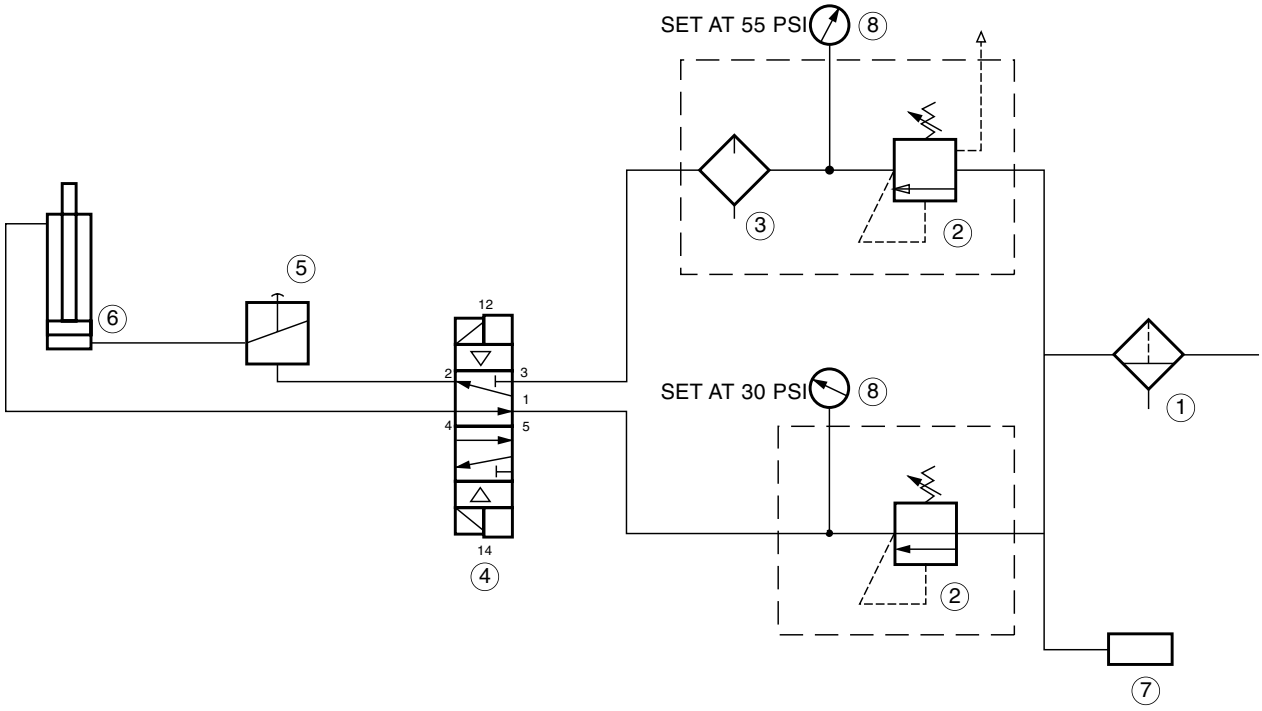




PNEUMATIC FLOW DIAGRAM

1 . . . . Filter
2 . . . . Pressure Regulator
3 . . . . Lubricator
4 . . . . Valve
5 . . . . Valve
6 . . . . Carriage Release Cylinder
7 . . . . Air Pressure Switch
8 . . . . Gage





NOTES

PURCHASED COMPONENT DATA

GHC DATA PLATE

MODEL - SV3-10-1-E-RH-M
MFG. DATE - 11/00
HONING MACHINE - VERTICAL
STROKE - 48
SIN -
S.O.# -
VOLTS - 460
AMP. - 45
PH. - 3
CYCLE - 60

SPINDLE CARRIAGE RPM 300

BALDOR MOTOR
CAT. NO. - IDM3774T
SPEC. NO. - 07H658W747GI
FRAME - 215TC
SER. NO. F498
H.P. - 10 TE
RPM - 1760
VOLTS - 230/460
MAG. CURR. - 11/5.5
F.L.A. - 25.4/12.7
RPM MAX. - 6000
HZ. - 60
PH. - 3 CLASS - H DES. - B SER. F.- 1.00
NEMA NOM. EFF. - 91.7%

BLOWER - BALDOR

SPEC. - EF5000
RATING - 40C AMB. CONT.
SER. - 89803
H.P. - .2
TE
VOLTS - 230/460
AMPS - .8/.4
RPM - 3100
PH. - 3
HZ. - 60
CLASS - F

BREVINI GEAR BOX

TYPE - EM 1010 MN2
RATIO 7.1
SER. NO. - V13156
DATE 12/99
MC- 1369

HYDRAULIC POWER UNIT

THERMAL TRANSFER PRODUCTS INC.

MODEL - AOVH-10
SER. # - C-124316
TEMP - 350 DEG. F.
OPERATING PRESSURE - 300 PSI

COOLING FAN MOTOR - BALDOR

CAT. # - M3460
SER. - W0999
SPEC. - 34A51-232
H.P. - .5 TE
PH. 3
RPM - 3450
VOLTS - 220/380/460
HZ. 60
SER. FAC. - 1.25
F.L. AMPS. - 2.1-2/1
FRAME - 48
DES. - B
CODE - J
S.F.A.- 2.6-2.4/1.2
CLASS - B
NEMA NOM. EFF. - 68%
P.F. - 63%
RATING - 40C-AMB.-CONT.

HYDRAULIC PUMP MOTOR - BALDOR

CAT.# - CM3774T
SPEC. - #07C152W693 HI
H.P. - 10 TE
FRAME - 215TC
SER. F1099
RPM - 1760
PH. - 3
HZ. 60
S.F. - 1.15
VOLTS -
208-230/460
F.L. AMPS. - 28.5-28.4/14.2
CLASS - F
DES. - B
CODE - J
NEMA NOM. EFF. - 89.3%
P.F. - 73% RATING
40C - AMB. - CONT

RECIPROCATION PUMP - VICKERS

2348662 08-K-99-0
PVQ40 B2RA9 SS3F
20 C21 12

TOOL FEED PUMP - VICKERS

V10 1S2S 11C20
382065-3 K/98/0

RECIPROCATION VALVE - BOSCH

811 404 001

COMPENSATING VALVE - BOSCH

811 401 223

SUBPLATE - DAMAN

AD05HSPS12S 0899

TOOL FEED VALVE - BOSCH

810 231 006 4600 PSI
81WV06PIV1004WS 115/60 D51

CHECK VALVE - BOSCH

FB1 PD HM 101 C 50
9 810 161 087 4500 PSI
(9-810-161-171) (NEW NUMBER)

REDUCING VALVE - SUN

PBDB-LDN-EBQ 9HM7

RELIEF VALVE - SUN

RPEC-LDN-FBP 9DP6

2 STATION MANIFOLD - DAMAN

AD03PO22S 0598

3 WAY VALVE - WATERMAN

12C31S-FII5-T4

PILOT CHECK VALVE - KEPNER

2712T12

LUBRICATION PUMP

LUBE USA
SERIAL NO. - JET-11035
CODE NO. - 010961

COOLANT SYSTEM

GUSHER PUMPS INC.
MODEL # - 6P3-LONG SER. # - 1224-833
IMP. - 6081-A

ELECTRIC MOTOR - BALDOR

SPEC. - 34G226-231 FRAME - 48YZ
SER. - W0100 H.P. - .25 TE
VOLTS - 208-230/460 AMPS. -
RPM - 3450 HZ. - 60
SER. F. - 1.35 PH. - 3
CLASS - B DES. - B
CODE - L NEMA NOM. EFF. - 5416
P.F. - 73% S.F.A. - 1.3-1.2/.6
RATING - 40C AMB. - CONT.

MAGNETIC SEPARATOR - FLOWCON

MODEL - HPS-10 SERIAL - 5816-10

MAGNETIC SEPARATOR MOTOR BALDOR

CAT. NO. - VM3534 SPEC. - 34A63-884
FRAME - 56C SER. - W398
H.P. - .33 TE VOLTS - 208/230/460
AMPS. - 1.8/1.6/.8 RPM - 1725
HZ. - 60 PH. - 3
CLASS - B SER. FAC. - 1.35
DES. - B CODE - M
NEMA NOM. EFF. - 68% P.F. - 57%
RATING - 40C AMB. - CONT. S.F.A. - 1.9/1.8/.9

GEAR REDUCER - WINSMITH

MODEL # - 2MCVD DATE - 05-98
PART # - B 327 74XOP5 INPUT RPM - 1800
SER. FACT. - 1 INPUT H.P. - .19
RATIO - 750 OUTPUT TORQUE - 621
AGMA LUBE - AGMA 8 FOR TEMP. - 51-110 DEG. F.

Setting Record (for FR-A200E-UL series) Part 1

FUNCTION	PART #	NAME	DISPLAY	RANGE	SETTING	SET VALUE
	0	rorous ooost (manuan	Tro Soft	01030%		
	1	Maximum frequency	Man F1	0 to 120"z	12ClMi	
	2	Minimum frequency	Min Fit	0 to 120Hz	OHR	
	3	flags frequency	WbsodiFl	0 to 400"t	6011a	
	4	Multi-speed selling (high speed)	presetri	0 to 400"z		
	5	Mulli-liveed Boiling (Middle speadl	PfQs*W2	0 to 400til		
	6	Multi-ilileed selling (low speed)	pfesswll	0 to 40011Z	10"l	
	7	Acceleration time	Acc.Tl	0 to 35M seconded	'2	
	7	Acceleration time	,0 to 300 seconds			
	8	c"fallon time	Dec Tl	0 to 36M secondell	'2	
	8		0 to 300 seconds			
	9	Electronic thermai OIL relay	5*4 THM	0 to 500A	13	
	10	DC Infection brake operation frequency	DC BrF	0 to 120"2, 9999	311z	10
	11	DC injection broke operrallon time	Dc ar.T	: to 10 so"rids.	0.5 Second a	
	12	C)C injection broke voltage	oc ar.v	0 to 30%		
	13	Starting frequairmy	store F	0 to 40tilt	0 5"z	
	14	Applied land selection	Load VF	0. 1. 2. 3. 4, 5	a	
	15	Jog frequency	JOG F	.0 to 400111	Shz	
	16	Jog secoloralionilloceiefallion time	JOG T	0 to 3600 soconow	0 3 seconds	
	16			0 to 300 ascends		
	17	External thermal Orl. relay input	JOWO"	0.1.2.3	0	
	18	high-speed maximum frequency	Max.FZ	120 to 400"t	120"it	
	19	8810 frequency voltage V	Fbass V 5 to mov. asaa.		9999	
	20	Accaterstiorildocaletabon reference-freauency	AcctOecF	I to 40(Mz	SOft	lzo
	21	Accolemisonidocelarabon time increments	Imr.T	0.1	0	
	22	Stop prevention overnown is"i	Btu PVI	0 to 20011A, 9999	150%	
	23	Stall prevention operation lovei correction coefficient				
	23	at double soe*d	31U PV2	0 to 200%, 99"	9	
	24	muiwope*d setting (speed 41	Presetirill	0 to 401211. 9999	9999	
	25	Multi-spoiad setting (speed 5)	pfuletF5	0 to 400tit. 9999	9111199	
	26	MulWipsed setting (speed 61	PresotFG'	0 to 40tMa. 9999	9"9	
	27	Mulwagood setting (speddl 71	Prossitil"T	0 to 400ttt. 9999	91HI19	
	28	Multil-speed input como9nestion	pre.comp 0.1	0		
	29	Acceierattonfil9ceisration oaftern	AcciDecP	0.1.2.1	0	
	30	Exteinni broke radiator selection	er.61A	0.1	0	
	31	Free us ncy jump l A	FWmp IA	0 to 400ttz. 9999		
	32	Frequency iumv 15	Flume 16	0 to 4001ft. 9999	9999	
	33	Fisquency jump 2A	Ffump 2A	0 to 400HI. 9999	9999	
	34	Frequency lump 20	Flump 20	.0 to 400"9. 9999	91111111119	
	35	Frequency pump 3A	Flumo 3A	0 to 400ttZ. 9999	9999	
	36	Frequency jump 30	Flump 3a	0 to 40ONZ. 9999	"99	
	37	Speed display	Disound	2 to 10. 11 to 999111	4	
	38	Automatic torque boost	A Tr4flot	0to200%	0	
	39	Automatic torque boost operation starting current	HoLood 1	0 to 500A	0	
	40	output terminus assignment	Selectoo	01091199	1234	
	41	1,19-to-froovency sonvilivily	SU Range	0tol00%	10%	
	42	Output frequency detection	3stFU FW	0 to 400"a		
	43	Output frequency detection at favors a rotation				
	44	Second acceleration/decoldration time	Acl0scT2	0 to 3800 secondal	5 **Cando	
	44	Second acceleration/decoldration time	Acl0scT2	0 to 360 seconds		
	45	Second deceleration time	Doc r2	0 to 3000 secondW		
	45	Second deceleration time	Doc r2	0 to 350 seconds.		
	46	Second torque tippet	Tro.0912	0 to 30%. 9999	9999	
	47	Second VIF (base frequency)	VFbaoeF2	10 to 400"z. 9999	"so	
	48	Second staff Prevention operation current	51&112 1	10 to 200%	150%	
	49	Second visit prevention operation frequency	Slal12 F	0 to 400"z	0	
	50	Second output frequency daieciton	SetFU 2	10 to 400hr	30liz	I

Note: *l 6% (7.5K or down). 3% (11K or up)
*2 5 seconds (7.5K or down). 15 seconds (111K or up)
*3 Rated inverter output current (A)
Provided that 0.4K 2.6A. 0.75K 4.3A (200V series)
0.4K 1.3A. 0.75K 2.2A (400V series)

FUNCTION	PART #	NAME	DISPLAY	RANGE	SETTING	SET VALUE
	51	Inverter LEO display data selection	Set LED	I to 14, 17. 10	1	X
	52	PU main dmolay data selection	set Main	0, 17 to 20. 23. 24		
	53	PU level display date selection	Sol Lvl.	0103.510 14. 17,	1	
	53	PU level display date selection	Sol Lvl.	1 to 3. 5 to 14, 17,		
	54	FM terminal function selection	Set FIM	10,21. 101 to 103,	1	
	54	FM terminal function selection	Set FIM	10510114, 11T.		
	54	FM terminal function selection	Set FIM	11 a, 121		
	55	Frequency monitoring reference	CalbFM F	0 to 400hr	SOME	
	56	Current monitoring reference	4CalbFM 1	0 to 5OOA_	-4	
	57	Restart coasting time	Rwshilrl	0 to a *Mondrl, OM	9999	
	58	Restart cushion time	ResUtT2	0 to 5 secondr;	1.0 second	
	59	Remote setting function selection	Rnd set	0.1,2	0	
	60	Intelligent mode selection	InI.Mode	10106	0	
	61I	Reference I for intelligent mode		10 to 500A. 99"	99"	
	62	Rot. I (of intelligent mode accoll		0 to 200%. 9999	9"	
	63	Rot I for Intelligent made decal		10 to 2001111, 9999	99"	
	64	Starting I for elevator mode		a to IONZ. 909	"99	
	65	Retry selection	Retry	0 to 5	0	
	66	Stall prevention operation reduction starting frequency	Still colf	0 to 40cht	GONZ	
	67	Number of raffles at alarm OCCUU6111CS	Retry No	.0 to 10	a	
	68	Retry wading time				
	69	Retry count display erasure	Retry M	0		
	70			0 to 1511610 to 30%		
	70	Special regenerative broke dilly	er.Outy	10% (Note a)		/0
	71	Applied motor	SolMolor	Ojos .13tale.20	a	
	72	PWM frequency selection	PWM F	10.7 to 14.5K"z		
	73	0 to SV, 0 to I OV selection				
	74	Reasons* time for analog signal	IpIIfter	CIO$	I	
	75	React sitiectionIPU disconnection dejection	RES Mode	0.1.2.3	0	
	76	Alarm code output selection	Alanin OP	0.1.2.3	0	
	77	Parameter write disable selection	Enablowt	0.1.2		
	78	Reverse rotshon prevention solection	EnableFR 0.1.2	0		
	79	operation mode selection	Contmode	0108'7		a
	80	Motor capacity	Motor KW	0.4 to 55kW. 9999	9999	
	81			2, 4 0. 12. 14.10,	99"	
	81	Number of motor poles	Mpole No		999i;	
	83	Rated motor voltage	Motor V	a to I CGOV	200 'G	
	84	Rated motor frequency	Motor 1	5010 120"1	60	
	96	Auto tuning sattinglittato	AuloTune,		0.1-101	
	145	Parameter unit language switching	PU Long			
	155	RT activated condition	RT set	0,10'		
	15a	Stall prevent. select at regeneration	Sto ply	01031.100		
	157	OL signal waiting time	OL delay	99; 25 seconds-	0.1 locondle	
	158			I to 3,5 to 14, 17,		
	158	AM terminal function selection	AM set	10.21.999		
	159	PVVM f decrease at low speed	PWM31	0,1.2.3		
	900	FM terminal calibration	FM Tuns		-	
	901	AM terminal calibration	AM Tun*		-	
	902	Frequency setting voltage bias	ExtVbtuo	0 to I OV 0 to 40hr	OV Ohl	
	903	Frequency loading voltage gain	Psivool"	0 to I OV It* 40011X	5v ectir	2 0
	904	Frequency selling current blow	Exilblas	o to 20MA 0 to 60HZ	4mA 0" It	
	905		0 0 ZOmA	20mA eOHz		
	905	Frequency setting current gain	ExIlgain	1 :0 400"t		

Note: *4 Inverter output current (A)

*5 The setting range depends on the Inverter capacity: (0.41K to 1. 5K)/(2.2K to 7.5K)I(l 1 K and up)

*5 The factory setting for the FR-A240E-UL (40OV) series is 40OV.

*7 Pr. 79=6 is set. switch-over function is selected.

NOTES

Like any machinery, this equipment may be dangerous if used improperly. Be sure to read and follow instructions for operation of equipment.

FRACTION / DECIMAL / MILLIMETER EQUIVALENTS CHART

INCH FRACTION	INCH DECIMAL	MILLIMETER	INCH FRACTION	INCH DECIMAL	MILLIMETER	INCH FRACTION	INCH DECIMAL	MILLIMETER
. . . .	.003937	0,1000	9/32	.281250	7,1438	21/32	.656250	16,6688
. . . .	.007874	0,2000	19/64	.296875	7,5406	. . . .	.669291	17,0000
. . . .	.011811	0,3000	5/16	.312500	7,9375	43/64	.671875	17,0656
1/64	.015625	0,3969	. . . .	.314961	8,0000	11/16	.687500	17,4625
. . . .	.015748	0,4000	21/64	.328125	8,3344	45/64	.703125	17,8594
. . . .	.019685	0,5000	11/32	.343750	8,7313	. . . .	.708661	18,0000
. . . .	.023622	0,6000	. . . .	.354331	9,0000	23/32	.718750	18,2563
. . . .	.027559	0,7000	23/64	.359375	9,1281	47/64	.734375	18,6531
1/32	.031250	0,7938	3/8	.375000	9,5250	. . . .	.748031	19,0000
. . . .	.031496	0,8000	25/64	.390625	9,9219	3/4	.750000	19,0500
. . . .	.035433	0,9000	. . . .	.393701	10,0000	49/64	.765625	19,4469
. . . .	.039370	1,0000	13/32	.406250	10,3188	25/32	.781250	19,8438
3/64	.046875	1,1906	27/64	.421875	10,7156	. . . .	.787402	20,0000
1/16	.062500	1,5875	. . . .	.433071	11,0000	51/64	.796875	20,2406
5/64	.078125	1,9844	7/16	.437500	11,1125	13/16	.812500	20,6375
. . . .	.078740	2,0000	29/64	.453125	11,5094	. . . .	.826772	21,0000
3/32	.093750	2,3813	15/32	.468750	11,9063	53/64	.828125	21,0344
7/64	.109375	2,7781	. . . .	.472441	12,0000	27/32	.843750	21,4313
. . . .	.118110	3,0000	31/64	.484375	12,3031	55/64	.859375	21,8281
1/8	.125000	3,1750	1/2	.500000	12,7000	. . . .	.866142	22,0000
9/64	.140625	3,5719	. . . .	.511811	13,0000	7/8	.875000	22,2250
5/32	.156250	3,9688	33/64	.515625	13,0969	57/64	.890625	22,6219
. . . .	.157480	4,0000	17/32	.531250	13,4938	. . . .	.905512	23,0000
11/64	.171875	4,3656	35/64	.546875	13,8906	29/32	.906250	23,0188
3/16	.187500	4,7625	. . . .	.551181	14,0000	59/64	.921875	23,4156
. . . .	.196850	5,0000	9/16	.562500	14,2875	15/16	.937500	23,8125
13/64	.203125	5,1594	37/64	.578125	14,6844	. . . .	.944882	24,0000
7/32	.218750	5,5563	. . . .	.590551	15,0000	61/64	.953125	24,2094
15/64	.234375	5,9531	19/32	.593750	15,0813	31/32	.968750	24,6063
. . . .	.236220	6,0000	39/64	.609375	15,4781	. . . .	.984252	25,0000
1/4	.250000	6,3500	5/8	.625000	15,8750	63/64	.984375	25,0031
17/64	.265625	6,7469	. . . .	.629921	16,0000	1	1.000000	25,4000
. . . .	.275591	7,0000	41/64	.640625	16,2719	1-1/16	1.062500	26,9880

FORMULAS:

MULTIPLY		BY		TO GET
INCHES (in)	x	25.4	=	MILLIMETERS (mm)
FEET (ft)	x	0.3048	=	METERS (m)

MULTIPLY		BY		TO GET
MILLIMETERS (mm)	x	0.03937	=	INCHES (in)
METERS (m)	x	3.281	=	FEET (ft)

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